User's and Installation Guide
UPS 40–160 kVA,
400V 50/60 Hz output

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UPS 40-160 kVA, 400 V 50/60 Hz output
User's and Installation Guide
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1 Safety Instructions

The UPS operates with mains, battery or bypass power. It contains components that carry high currents and voltages. The properly installed enclosure is grounded to earth and IP20 rated against electrical shock and foreign objects. However, only qualified personal is allowed to install and service the UPS.

Warning!

Operations inside the UPS must be performed by a service engineer from the manufacturer or from an agent authorised by the manufacturer.

Do not ever service inside the UPS when mains power is applied or the UPS is running in battery mode. Use the optional mechanical bypass if installed to the system. Remember to open battery breaker. Always ensure by measuring with a multi-meter that no dangerous voltages are present.

1.1 Audience

The intended audiences of this manual are people who plan the installation, install, commission, and use or service the UPS. The manual provides guidelines to check delivery, installing and commissioning of the UPS.

The reader is expected to know the fundamentals of electricity, wiring, electrical components and electrical schematic symbols. This manual is written for a global reader.

Note!

Read the manual before operating or working on the UPS.

1.2 CE marking

The product has the CE marking in compliance with the following European directives:

- LV Directive (Safety) 72/23/EEC and 93/68/EEC
- EMC Directive 89/336/EEC, 93/68/EEC and 92/31/EEC

Declaration of conformity with UPS harmonised standards and directives EN/IEC 62040-1-1 (Safety) and EN/IEC 62040-2 (EMC) are available on the web site (http://www.powerware.com).

Warning!

WARNING This is a product for restricted sales distribution to informed partners (EN/IEC 62040-2). Installation restrictions or additional measures may be needed to prevent electromagnetic disturbances.

1.3 User precautions

The only user operations permitted are:

- Start up and shut down of the UPS, excluding the commissioning start-up.
- Use of the LCD control panel and Maintenance Bypass Switch (MBS)
- Use of optional connectivity modules and their software

The user must follow the precautions and only perform the described operations. Any deviations from the instructions could be dangerous to the user or cause accidental load loss.

Warning!

The user is not permitted to open of any screws excluding connectivity plates. Failure to recognise the electrical hazards could prove fatal.

1.4 Environment

The UPS must be installed according to the recommendations in this manual. Under no circumstances the UPS should be installed in an airtight room, in the presence of flammable gases, or in an environment exceeding the specification.

Excessive amount of dust in the operating environment of UPS may cause damage or lead to malfunction. The UPS should be always protected from the outside weather. The recommended operating temperature is from +15 to +25 Celsius degrees.

1.5 Inquiries

Address any inquiries about the UPS and battery cabinet to the local office or agent authorised by the manufacturer. Please quote the type code and the serial number of the equipment.

2 Introduction

The product described in this manual is a transformerless Uninterruptible Power System (UPS). It is a true online, continuous duty, double conversion, static state, three-phase system, providing conditioned and uninterruptible AC power to protect the customer's load from all nine power failures.

2.1 System description

The UPSs are used to protect sensitive IT equipment and prevent loss of valuable electronic information, minimise equipment downtime, and minimise the adverse effect on production equipment due to unexpected power problems.

The UPS system continually monitors incoming electrical power and removes the surges, spikes, sags, and other irregularities that are inherent in commercial utility power. Working with a building's electrical system, the UPS system supplies clean, consistent power that sensitive electronic equipment requires for reliable operation. During brownouts, blackouts, and other power interruptions, batteries provide emergency power to safeguard operation.

The UPS system is housed in single freestanding cabinets. The cabinets line up and match in style and colour, and have safety shields behind the doors for hazardous voltage protection.

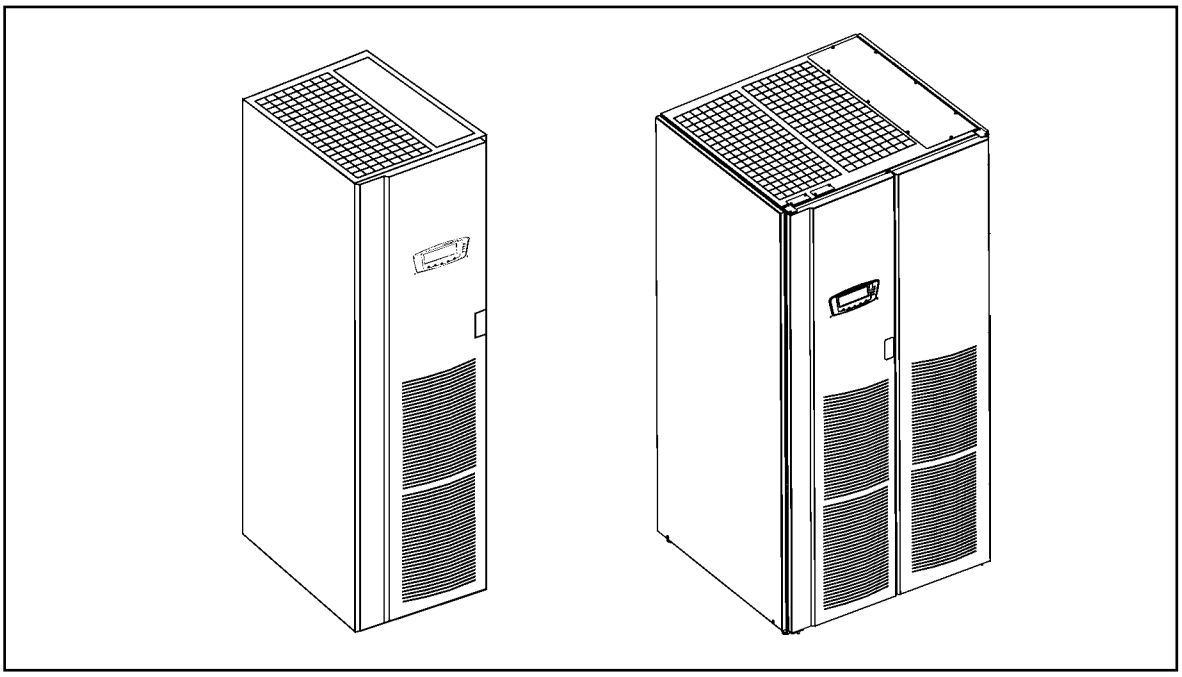


Figure 1. UPS cabinet 40-80 & 100-160 kVA, 400 VAC 50/60 Hz.

2.2 Feature: Active-Front Technology

Traditional input THD filters are no longer needed with this UPS product. The build-in advanced rectifier technology of UPS modules provides perfect sinusoidal input power quality at 0.99 input power factor with harmonic content less than 5% THD(i). This leads to more reliable total system operation and savings in generator and transformer sizing as losses in the windings are minimised.

Due to the active front rectifier, the UPS is comparable to a clean resistor load from the mains perspective. Thus, the high input power factor provides minimised cabling and fusing costs due to no reactive power consumption.

The low harmonic currents are due to high input power factor and provide the benefits:

- No additional losses in wires and cables
- No extra heating of transformers and generators with shortened service life
- No false circuit breaker tripping and malfunction
- No erratic operation of computers, telecommunication, monitors, electronic test equipment etc.
- No Resonance with power factor correction capacitors

2.3 Feature: Advanced Battery Management (ABM)™

The ABM monitors the status of the battery and charges it only when the battery needs charging. This is the key to long battery life with the ABM due to low generation of corrosion inside the battery. It also monitors that the load never crashes because of bad or defected battery.

The main cause for corrosion is current flowing through battery. The more current going through battery, the shorter the battery life. Current flows through battery when it is discharged or charged. There is very little that can be done for discharging, because it depends on number of power outages in utility line.

The ABM is very valuable feature since most of the time battery does not need any charging. The charging is controlled and initiated on the following occasions:

- When turning the unit on
- After 18 days without charging
- If the open cell voltage decreases below predetermined voltage level

Hence, the function of ABM system is to prolong the battery life considerably compared to traditional system that uses float-charging technology. This means that there is no current going through batteries all the time and causing corrosion. In a traditional online UPS the inverter also causes ripple-current to be fed to batteries causing corrosion.

2.4 Feature: Hot Sync® technology

The UPS product features U.S. #5,745,365 patented paralelling technology that provides N+X redundancy without introducing a single-point-of-failure. The products utilising the Hot Sync are completely autonomous and the only thing common among them is the critical output power bus.

The Hot Sycn is 100% mathematical firmware that makes it more reliable than traditional paralleling techniques. Because the solution is implemented intrinsically, and Hot Sync is always active, the UPS modules do not know whether or not they are even in parallel.

A parallel UPS system means the linking together of two or more UPS units in parallel so that in the unlikely event one fails the other can automatically take up the load. Traditionally a parallel redundancy configuration is achieved by having a random or fixed master-slave relationship among the UPS units. This master logic gives out individual commands to all the slaves units. Unfortunately this can lead to a single-point-of-failure for the whole system because if the master logic or communication to slaves fails, and causes the whole UPS system to be in trouble.

The Hot Sync® technology was developed to allow parallel capacity system and to maintain the highest system availability. An industry leading paralleling technology in its own right, the patented Hot Sync enables you to set up a parallel redundant system giving you 100% conditioned power at all times. Its unique digital design eliminates the system level single point of failure inherent in traditional parallel UPS modules, and exponentially increases the reliability of the overall system.

Hot Sync allows up to four UPS units to cover the same load in parallel and redundant configuration. No vulnerable master logic is needed in this patented design. It provides automatic load sharing and module level redundancy with nothing other than the power connecting the Hot Sync version of UPS modules.

2.5 Basic system configuration

The following basic UPS system configurations are available:

- A single UPS system:
  - UPS cabinet (40-60-80 kVA, 100-120-160 kVA)
  - Battery cabinet or battery rack (10-120 min back-up time)
  - LCD display for easy configuration (Std.)
  - Web/SNMP communication capability (Std./Optional)

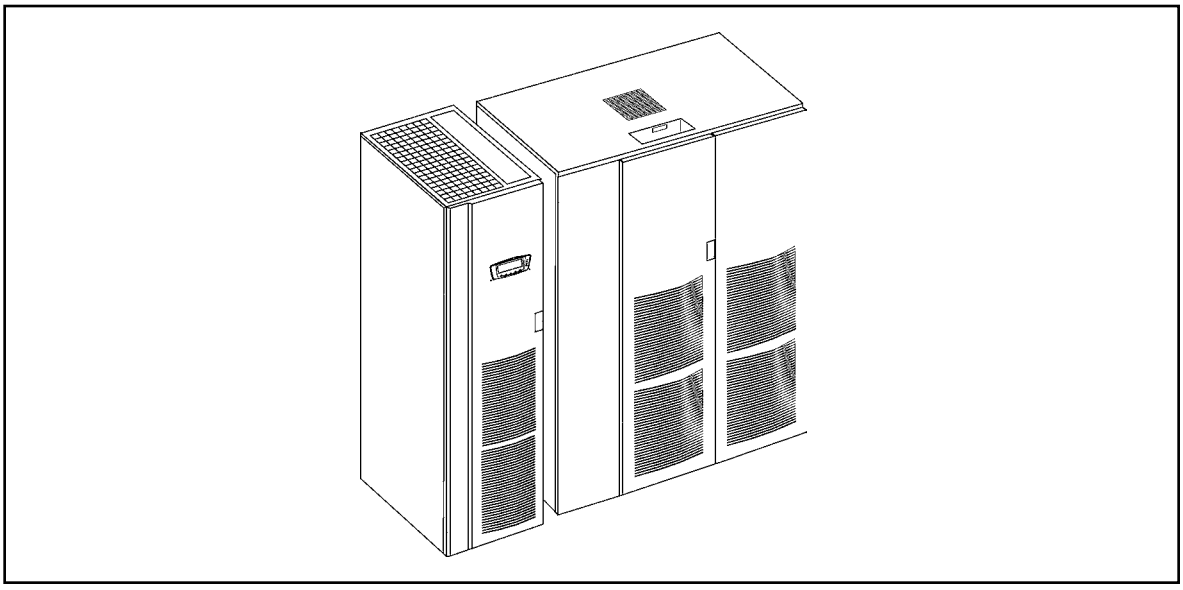


Figure 2. UPS 40-80 kVA configuration with Large battery cabinet.

Adding optional accessories can enhance the UPS system configuration. These include extensive X-slot communication adapters. As a standard the selected UPS models are delivered with advanced Web/SNMP communication capability to interface with a network management system.

3 UPS installation

Before installing the UPS systems read and understand how this manual applies to the system being installed. Use the procedures and illustrations in the following chapters to create a logical plan for installing the system.

3.1 Planning installation

The UPS and accessories are delivered on a specifically designed pallet that is easy to move with a forklift or a pallet jack. Make sure that the floor surface is solid and suitable for the wheeling and heavy weight. Keep the UPS always in upright position and do not drop the equipment. Do not either stack the pallets because of high-energy batteries involved and the heavy weight

Use a forklift or pallet jack to move the packaged cabinet to the installation site, or as close as possible, before unpacking. Insert the forklift or pallet jack forks between the pallet supports on the bottom of the unit. Set the pallet on a firm, level surface, allowing a minimum clearance of 3m on each side for removing the cabinet from the pallet.

Note!

If the UPS is not immediately installed the following must be remembered:

- The UPS should be stored in the original packing and shipping carton.
- Do not tilt the UPS cabinet more than 10° from vertical or cabinet may tip over.
- The recommended storing temperature is between +15° … 25°.
- The equipment must always be protected from moisture and weather.

The life of the UPS system is adversely affected if the installation does not meet the following guidelines:

- The system must be installed on a level floor suitable for computer or electronic equipment.
- The system must be installed in a temperature and humidity controlled indoor area free of conductive contaminants.
- The UPS cabinet uses forced air cooling to regulate internal component temperature. Air inlets are in the front of the cabinet and outlets are in the top. You must allow clearance in front of and above each cabinet for proper air circulation.

The operating environment must meet the weight, clearance, and environmental requirements in the technical specification.

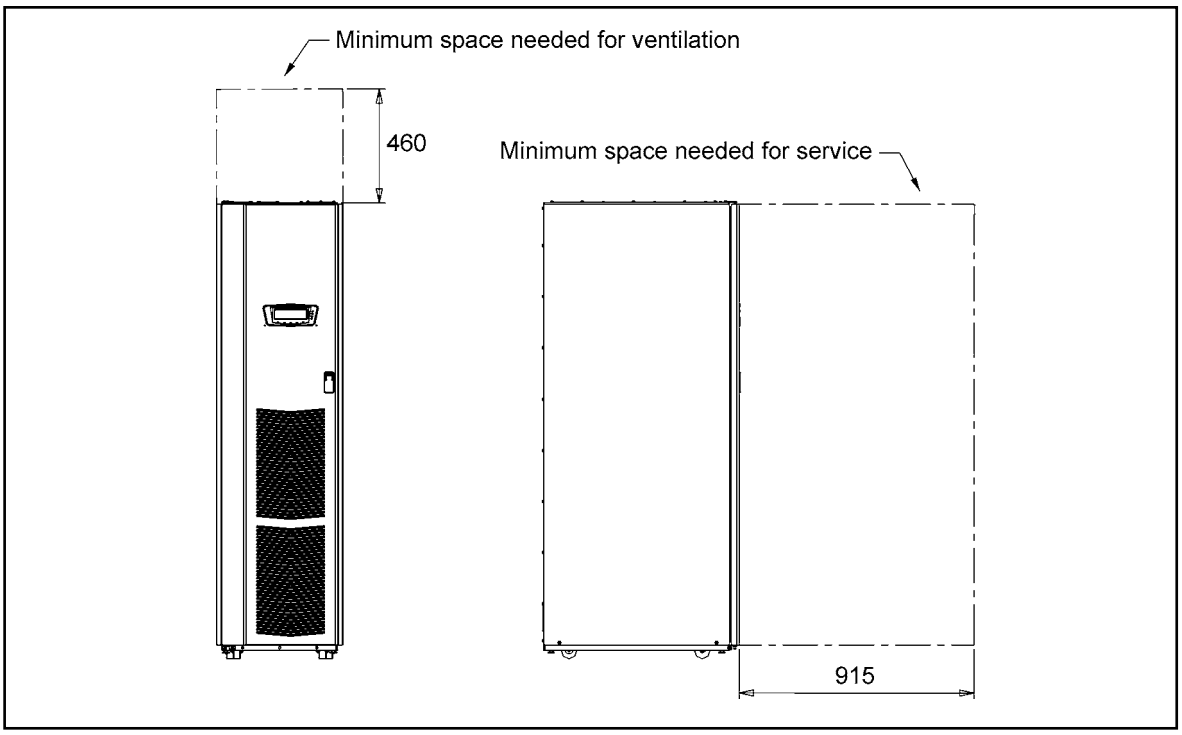


Figure 3. Minimum clearance in top and front of UPS 40-160 kVA

3.2 Unpacking and visual inspection

The UPS cabinet is bolted to a wooden pallet supported by wood skids. To remove the pallet, perform the following procedure:

1. If not already accomplished, use a forklift or other material handling equipment to move the cabinet to the installation area, or as close as possible, before unloading from the pallet. Insert the forklift jacks between the skids on the bottom of the unit.
2. Unfasten front door latch and swing door open.
3. If the levelling feet are not fully retracted, turn the levelling feet until they are retracted.
4. Remove bolts and shipping brackets, which are used to fasten UPS to the pallet.
5. Slowly roll the cabinet toward the rear of the pallet. Once the pallet tilts, continue rolling the cabinet down the pallet until the cabinet is clear of the pallet.
6. Roll cabinet to final installation location.
7. Secure the UPS cabinet in position by lowering the levelling feet, until cabinet is not resting on the casters and the cabinet is level.

Note!

The UPS cabinet is heavy. If unpacking instructions are not closely followed, the cabinet may tip and cause serious injury.

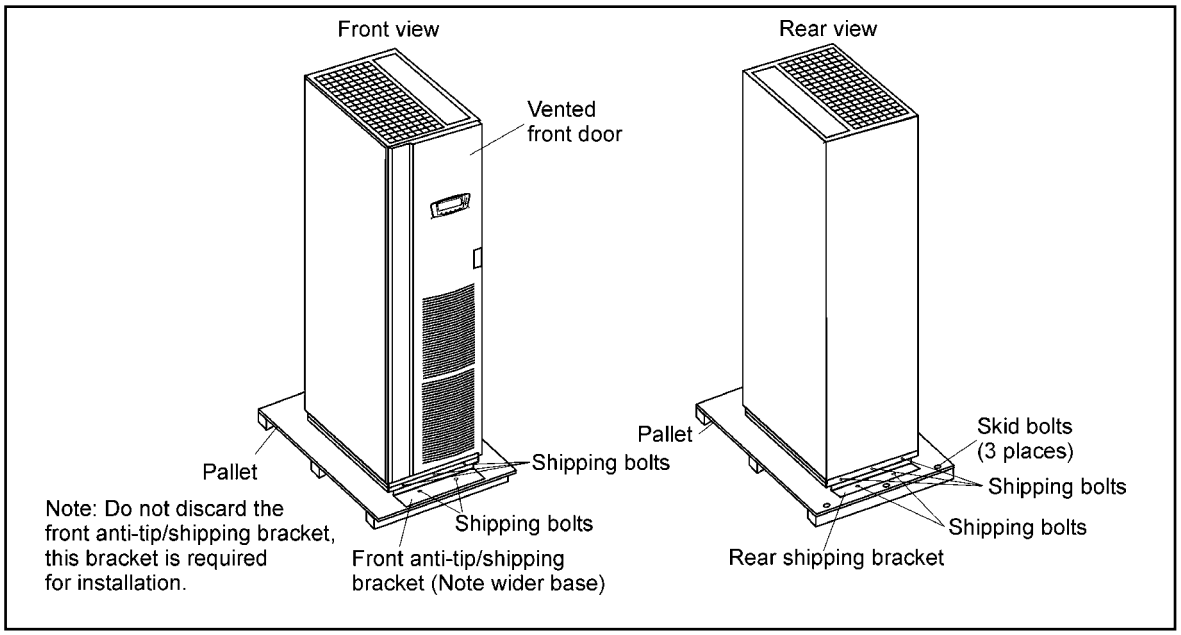


Figure 4. Removing bolts and shipping brackets.

Unpack the equipment by removing the packing and shipping materials. If the equipment has been transported in the upright position the outside 'Tip&Tel' indicator should be intact.

Make a visual inspection and check that there are no signs of shipping damages. The inside 'Drop&Tell' indicator shall be intact if the equipment has been handled properly.

Note!

A claim for shipping damage must be filed immediately and the carrier must be informed within 7 days of receipt of the equipment. The packing materials and indicators should be stored for further investigation.

3.3 Delivery check

The UPS is delivered with the following items:

Plastic bag containing:
Web/SNMP adapter configuration guide (optional), English language
User's Guide, paper format, English language
Residual voltage warning stickers
Software Suite, CD-ROM format, English language
Delivery documents

Check the information on the type designation label of the equipment to verify that the unit is of the correct type. The type designation label includes ratings, a CE marking, a type code, a part number and a serial number. The serial number is important when making inquiries. It allows individual recognition of the equipment.

3.4 UPS cabinet installation

UPS cabinets must be permanently bolted or welded to the floor using the shipping brackets.

> **Note!**
>
> **UPS cabinets can fall over if the shipping brackets are not used. Both rear and front shipping brackets must be used to secure the UPS cabinet to the floor.**

3.5 Unloading the Battery Cabinet from the Pallet

The battery cabinet is bolted to a pallet consisting of four angle metal supports secured to two four-inch by six-inch wood supports.

1. Unfasten front door latch and swing doors open.

2. Remove doors. Remove the retaining screw located inside each door at the bottom hinge pivot point, then lift the door off. Save the retaining screws for reinstallation of the doors.

3. Locate the field kit (packed inside of the cabinet). Locate the four 1/2I jacking bolts and install them in the threaded holes in the front and rear supports. Place a floor protector underneath each jacking bolt, and screw the bolts down against them. The floor protectors protect the floor from being marred by the jacking bolts.

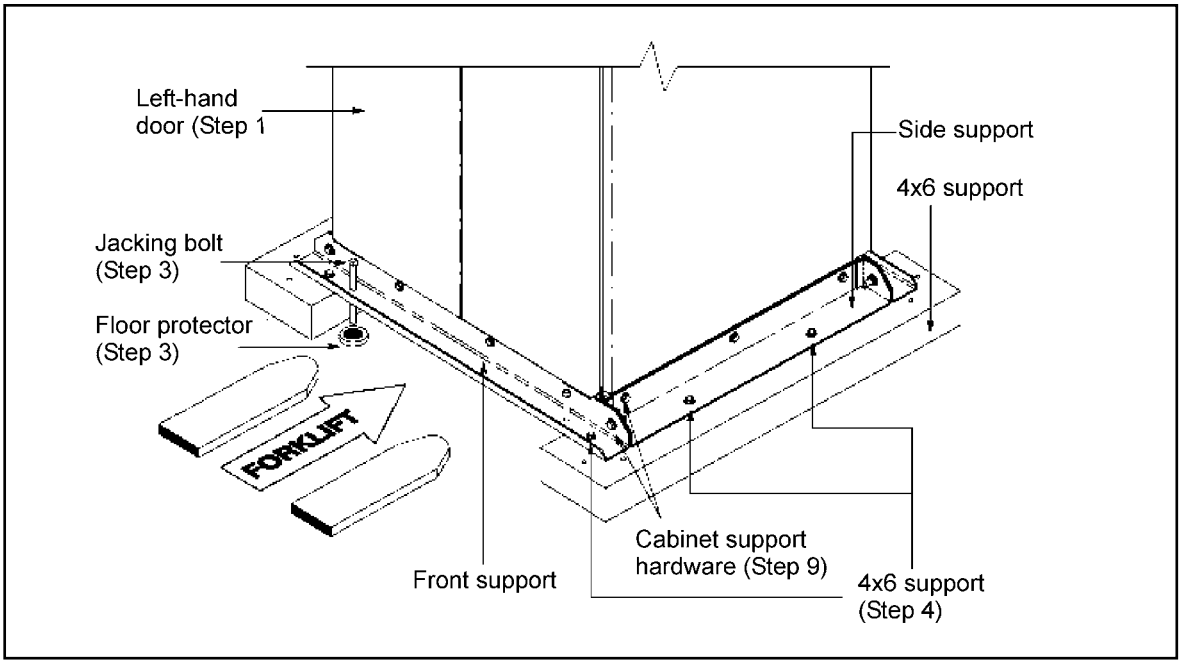


Figure 5. Removing Shipping Supports

4. Loosen, but do not remove, the hardware holding the 4×6 supports to the front and rear supports.

Warning

SERIOUS INJURY MAY OCCUR. Battery cabinets are extremely heavy. If unloading instructions are not closely followed, cabinet may tip.

5. Turn each jacking bolt consecutively, two full turns, until the 4×6 supports clear the floor by approximately 3 mm (1/8I).

Warning

RISK OF INSTABILITY. Turning the jacking bolts unevenly may cause the cabinet to become unbalanced. To prevent tipping the cabinet, raise and lower the jacking bolts evenly.

Note

CABINET MAY TIP. The battery cabinet should only be raised approximately 3 mm (1/8I) above the floor (just enough to allow removal of the 4×6 supports).

6. After the 4×6 supports clear the floor, remove the hardware loosened in Step 4. Pull the 4×6 supports out from under the battery cabinet. Please discard or recycle them in a responsible manner.

Note

CABINET MAY FALL. Do not loosen the hardware attaching the side or front supports to the cabinet base, or the front and side supports to each other, at this time. The cabinet must be lowered by the jacking bolts before the supports can be removed.

7. Carefully and evenly lower the cabinet by turning each jacking bolt consecutively two full turns (maximum) until the casters contact the floor, and the cabinet is no longer supported by the jacking bolts.

8. After the battery cabinet is resting on the floor, remove the jacking bolts and discard or recycle them in a responsible manner.

9. Remove the hardware holding the front, rear and side supports to the cabinet base. Discard or recycle the hardware and support brackets in a responsible manner.

10. The battery cabinet is now ready to be rolled to its final location.

11. Repeat Steps 2 through 10 for each cabinet you are preparing to install.

4 Electrical installation

The customer has to supply the wiring to connect the UPS to the local power source. The electrical installation procedure is described in the following text. The installation inspection and initial start up of the UPS and extra battery cabinet must be carried out by a qualified service personnel such as a licensed service engineer from the manufacturer or from an agent authorised by the manufacturer.

Warning!

Physical injury or death may follow, or damage may occur to the UPS or the load equipment if these instructions are ignored.

4.1 Procedure for locating the terminals

Power and control wiring can be routed through the top or bottom of the cabinet (see dimensional drawings) with connections made to easily accessible terminals.

1. If not already open, unfasten front door latch and swing door open.
2. Slide air filter up and remove from cabinet.
3. Remove screws securing bottom internal safety shield panel and remove panel to gain access to input, output, and battery terminals.
4. If installing power wiring from the top of the cabinet, proceed to step 5; otherwise, proceed to step 6.
5. Remove screws securing top internal safety shield panel and open panel to gain access to top entry wire way.
6. Remove UPS cabinet top or bottom wire entry conduit landing plate to drill orpunch conduit holes.
7. Route input and output cables through wire way to the UPS terminal blocks.
8. Reinstall conduit landing plate and install conduit.
9. Route and connect wiring.
10. When all wiring is complete, reinstall safety shield panels removed in previoussteps.
11. Close door and secure with latch.

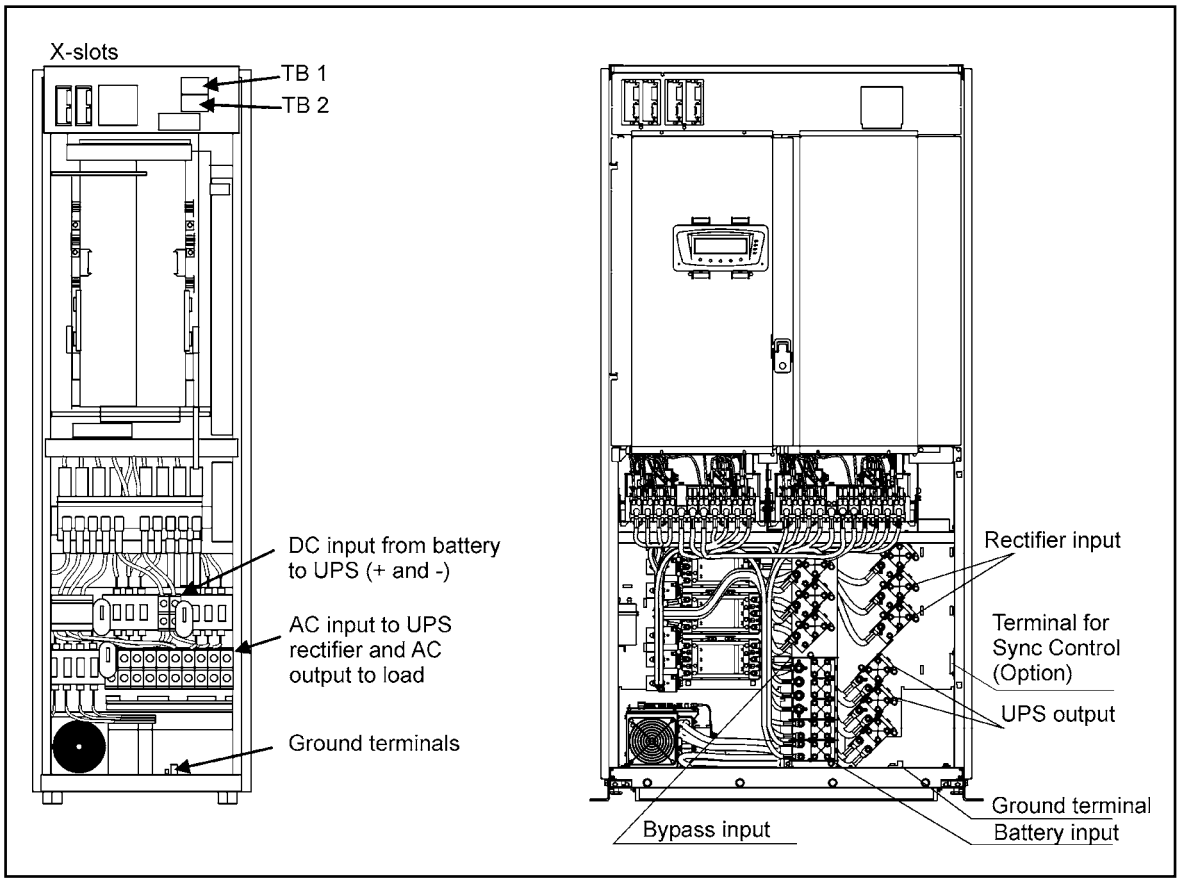


Figure 6. UPS (40-80, 100-160 kVA) power and communication terminal locations

4.2 UPS wiring procedure

The proper connection order is as follows:

1. Switch off the supply to the distribution point to which the UPS unit is to be connected.

2. For extra safety, also remove the fuses from the selected lines. Make absolutely sure with measurement that there is no power.

3. A readily accessible disconnect device must be incorporated in all fixed input wiring. The disconnect device shall have a contact separation of at least 3 mm.

   The UPS has automatic backfeed isolation but for extra safety a warning label can be added on all primary power isolators installed remote from the UPS area to warn electrical maintenance personnel.

   The warning label shall carry the following wording or equivalent:
   “ISOLATE UPS BEFORE WORKING ON THIS CIRCUIT”.

4. Check that electrical connections to the installation site have been properly executed. Also check fuse or circuit breaker ratings and cable dimensions against tables for 40-160 kVA systems.

5. The UPS should be connected in accordance with the wiring diagram. Be sure to ground the system according to local and/or national electrical wiring standards.

6. Connect phase L1, L2, and L3 rectifier input power wiring from source to the Rectifier Input Terminals in the UPS cabinet. See wiring diagram for cable and fusing requirements.

Note!

The rectifier requires a Neutral to operate. It's connected internally from the bypass terminal to the rectifier, see wiring diagram.

7. Connect phase L1, L2, L3, and Neutral bypass input power wiring from source to the Bypass Input Terminals and Neutral Terminals in the UPS cabinet.

8. Connect phase L1, L2, L3, and Neutral power wiring from Output Terminals and Neutral Terminals to the critical load.

9. Route battery cables from the Battery Cabinet to UPS Battery Terminal Block
   Note!
   UPS 40-80 kVA are delivered with (4) ferrite rings for battery cables and (2) ferrite clips for control cables. Those should be installed both at the UPS cabinet end to improve the EMC according to EU directives.

10. Connect positive, negative, and ground DC power wiring from battery cabinet to the battery terminal Block and ground terminals in the UPS cabinet.
    Note that the battery cables delivered with the battery cabinets are to be installed next to the UPS cabinet. Cables with higher current capacity are needed if the external battery cabinets or racks are installed with a distance from the UPS.

11. When all wiring is complete and the UPS system is connected to the facility power and critical load, reinstall safety shield panels removed in previous steps.

12. Close door and secure with latch. If an external bypass switch shall be used, contact your dealer first.

The UPS unit is now connected to the mains and to the load but there is no power. Make sure that the connections are properly made.

Standards SFS 6000-5-52 (2002) and IEC 60364-5-52 (2001-08) "Electrical installations of buildings" with normal 1.7xNeutral conductor rating for IT loads are used as a sizing guide. For any other conditions, size the cables according to the local safety regulations regarding installation environment, appropriate voltage and currents of the UPS.

Fuses are sized according to local safety regulations, appropriate input voltage and the rated current of the UPS. Therefore, protect the input and bypass cables with gG (gL) fuses or B-C-D type of circuit breakers against overload and short-circuit.

Contact the manufacturer's authorised agent or the local office for assistance at fuse and cable sizing. Refer to the recommended cable and fuse ratings in the below table.

Note!

In local solutions the two pole battery breaker ratings must be 300A / 500VDC with thermal magnetic trip and 48VDC undervoltage release (e.g. ABB's S5N300TDD-2AU7).

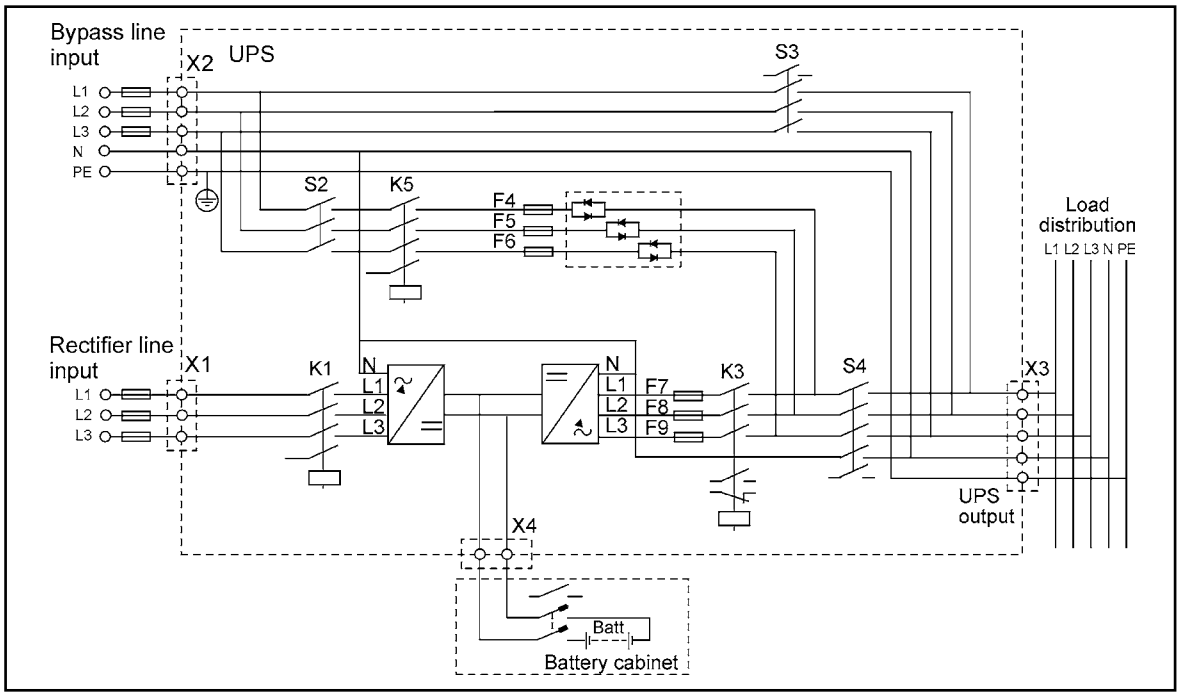


Figure 7. Five-wire installation of the UPS system 40 – 80 kVA with MBS

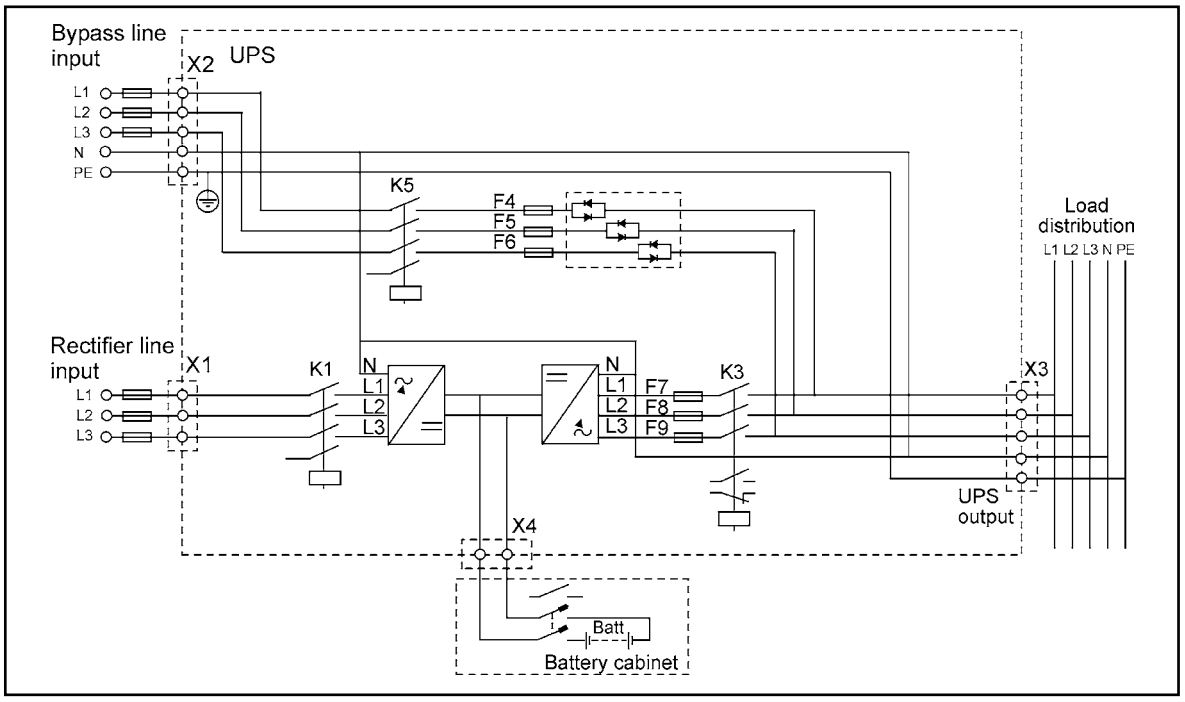


Figure 8. Five-wire installation of the UPS system 40 – 80 kVA without MBS

UPS rating		Rectifier input		Bypass input		Load		PE	Battery
		Fusing	Cable	Fusing	Cable	Cable	I nom	Cable	Cable
40 kVA	3-phase	3x80 A	3x35 mm²	3x63 A	4x25 mm²	3x25 mm²	58 A	16 mm²	2x70 mm²
60 kVA	3-phase	3x100 A	3x50 mm²	3x100 A	4x50 mm²	3x50 mm²	87 A	25 mm²	2x95 mm²
80 kVA	3-phase	3x125 A	3x70 mm²	3x125 A	4x70 mm²	3x70 mm²	116 A	35 mm²	2x95 mm²
Maximum	3-phase	n/a	3x95mm²	n/a	4x95 mm²	3x95mm²	n/a	50 mm²	95 mm²

Table 1. Recommended multi-core cable and fuse sizes for UPS 40-80 kVA.
(Cables with copper conductor temp. 70ºC, PCV insulation, and installation method C)

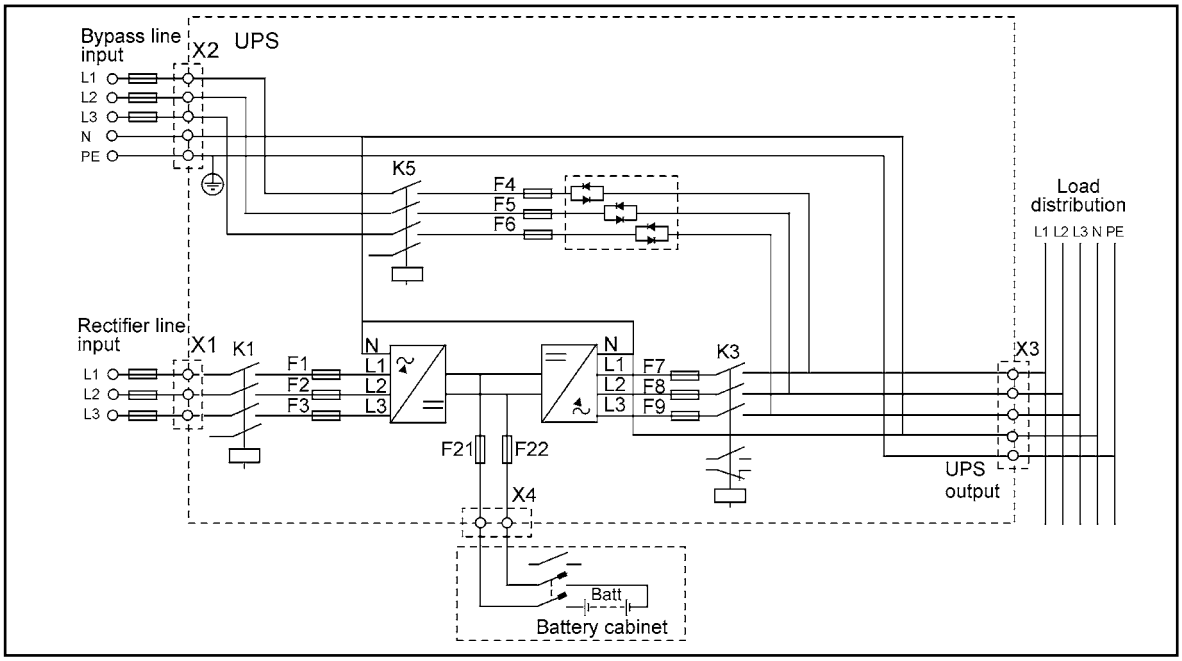


Figure 9. Five-wire installation of the UPS system 100 – 160 kVA without MBS

UPS rating		Rectifier input		Bypass input		Load		PE	Battery
		Fusing	Cable	Fusing	Cable	Cable	I nom	Cable	Cable
100 kVA	3-phase	3x160 A	3x95 mm²	3x160 A	4x95 mm²	3x95 mm²	144 A	50 mm²	120 mm²
120 kVA	3-phase	3x200 A	3x120 mm²	3x200 A	4x120 mm²	3x120 mm²	174 A	70 mm²	150 mm²
160 kVA	3-phase	3x250 A	3x185 mm²	3x250 A	4x185 mm²	3x185 mm²	231 A	95 mm²	185 mm²
Maximum	3-phase	n/a	3x185 mm²	n/a	4x185 mm²	3x185mm²	n/a	120 mm²	185 mm²

Table 2. Recommended multi-core cable and fuse sizes for UPS 100-160 kVA.
(Cables with copper conductor temp. 70ºC, PCV insulation, and installation method C)

4.2.1 Installing battery ferrite rings

Four ferrite rings are delivered with 40-80 kVA UPS and meant for DC power cables. It is recommended that all power wires (+ and -) are routed through the four ferrite rings. If the double cable is used, one pair of positive and negative (+ and -) wires should be routed through two ferrite rings and another pair of positive and negative (+ and -) wires should be routed though another two ferrite rings. In every situation place the ferrite rings as close the inside wall of the UPS cabinet as possible.

4.2.2 Installing ferrite clip for battery breaker

The ferrite clips are delivered and meant for control wires between the UPS and the battery breaker. Place the control wires to the notch of the clip, make a loop at least once and close the ferrite clip. Place the ferrite clip as close the inside wall of the UPS cabinet as possible.

4.3 Battery cabinets

Power and control wiring for integral line-up and match battery cabinets are supplied with the cabinets. The battery cabinet may be located either to the left or right of the UPS cabinet. Due to easier service access the recommended location is to the left of the UPS cabinet. The line up and match battery cabinets are wired through the side panels of the units.

Mechanical lugs, located at the front of the cabinet, reduce installation time, and removable battery trays with quick disconnects between trays reduce battery maintenance time. A DC-rated circuit breaker within each cabinet provides protection and servicing isolation.

The battery cabinets use convection cooling to regulate internal component temperature. Air inlets are in the front of the cabinet and outlets are in the top. Clearance must be allowed in front of and above each cabinet for proper air circulation.

- The system must be installed on a level floor suitable for computer or electronic equipment.
- The system must be installed in a temperature and humidity controlled indoor area free of conductive contaminants.

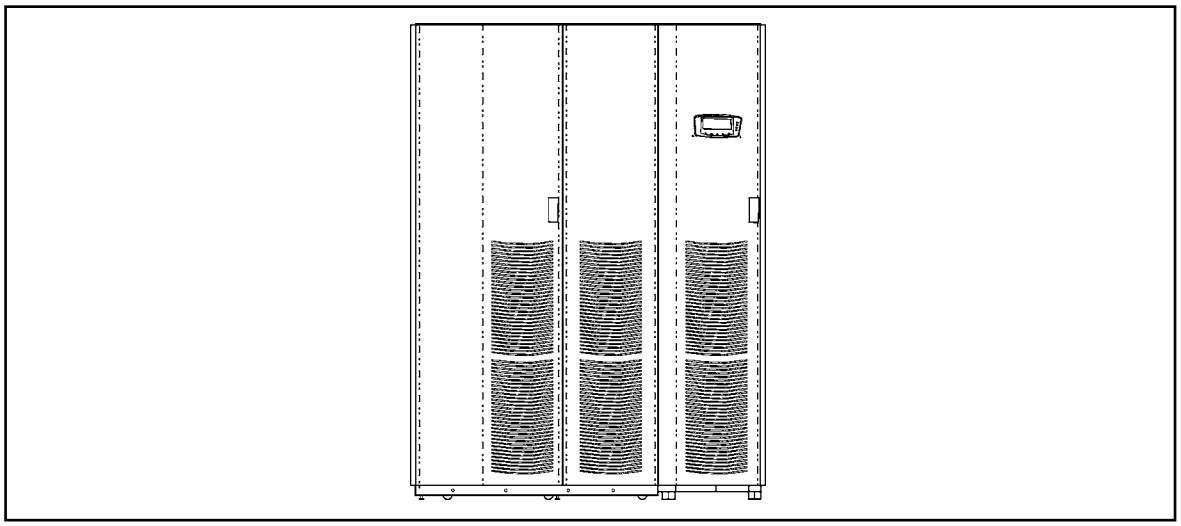


Figure 10. UPS 40-80 kVA with integral Large battery cabinet.

The battery cabinet is designed for industrial or computer room applications and should be handled with appropriate care. Observe these precautions when working on or around battery cabinets:

- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of batteries or battery cabinets.
- Do not tilt the cabinets more than +/-10° during installation.

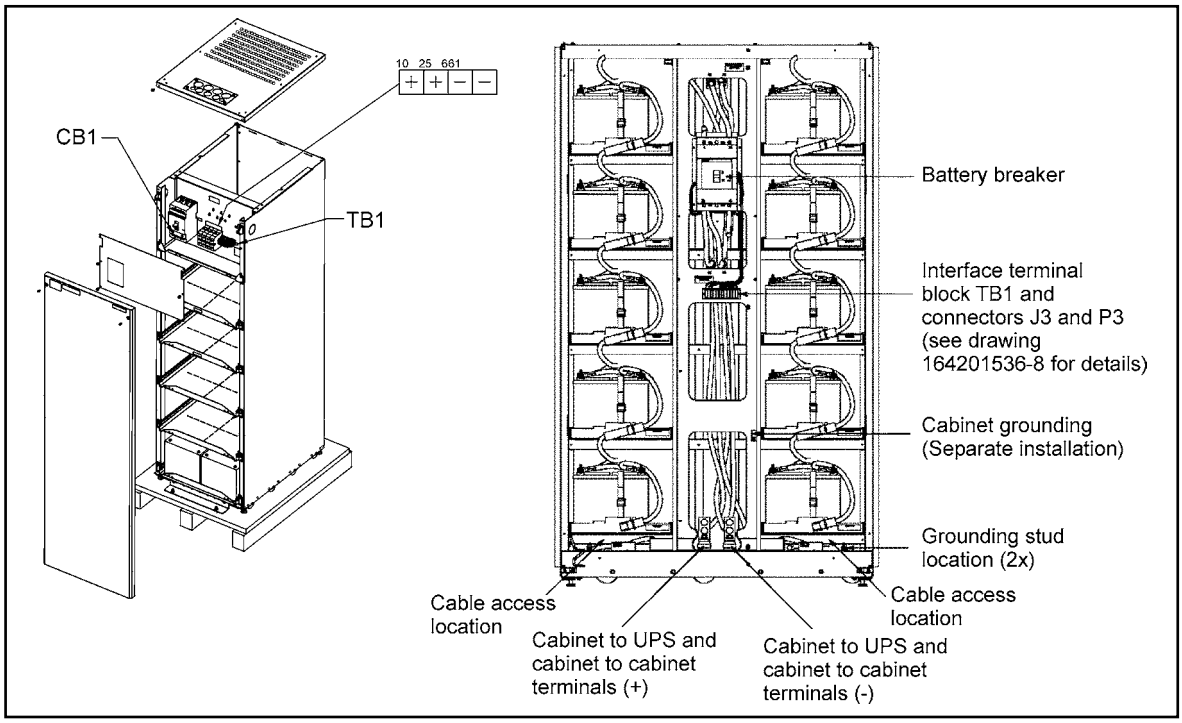

10 25 661
+ + − −
CB1
TB1
Battery breaker
Interface terminal block TB1 and connectors J3 and P3 (see drawing 164201536-8 for details)
Cabinet grounding (Separate installation)
Grounding stud location (2x)
Cable access location
Cable access location
Cabinet to UPS and cabinet to cabinet terminals (+)
Cabinet to UPS and cabinet to cabinet terminals (-)

Figure 11. Small and Large Battery cabinet with doors open and location of terminals.

Note!

The distance between large battery cabinet trays is 290 mm that includes local battery height and safety clearance. The maximum bottom size of a battery is 175 mm x 329 mm.

4.3.1 Integral battery cabinet installation procedure

This procedure assumes the battery cabinet is located to the left of the UPS cabinet.

Warning!

The battery cabinet contains lethal voltages. Qualified service personnel should perform installation and service only.

1. Make sure that the UPS is properly installed and secured with its levelling feet.
2. Roll the battery cabinet to an area near the left-hand side of the UPS.
3. Remove the field kit. The field kit is attached with cable ties to the frame inside the door. Retain the field kit for later use.
4. If necessary, remove the cosmetic cover and hanger brackets from the left-hand side of the UPS. Save cover, screws, and brackets for later reuse.
5. If necessary, remove the cosmetic cover and hanger brackets from the right-hand side of the battery cabinet. Save cover, screws, and brackets for later reuse.
6. Remove the knockout plug on the bottom left side of the UPS cabinet inside panel.

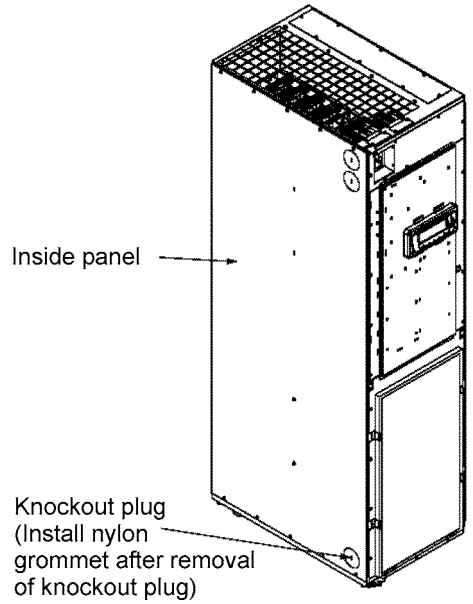


Figure 12. Location of the knockout plugs in the UPS unit.

7. Install nylon grommet from field kit around hole left after removal of knockout plug.
8. Push the battery cabinet toward the UPS cabinet until the doors are flush with each other. Level the cabinets with the levelling screws.
9. Two cabinet attachment brackets are provided for securing each cabinet at the top and bottom. A flat bracket joins the top of the cabinets and a larger flat bracket joins the cabinets at the bottom. Attach the flat bracket to the cabinet tops first.
10. Remove the left-hand screw from the top door hinge of the UPS cabinet and the right-hand screw from the top right door hinge of the battery cabinet. Align the holes in the small flat bracket from the field kit over these screw holes. Replace the screws in the hinges, securing the bracket to the cabinets.

11. Locate the large flat bracket from the field kit. Place one end of the bracket over the bolt on the bottom side of the lower right-hand hinge on the battery cabinet and the other end over the bolt on the bottom side of the lower left-hand hinge on the UPS cabinet.
12. Secure the bracket to the hinges with hardware from the field kit.
13. Route the ground wire (from the field kit) from the ground stud in the battery cabinet, under the lower right-hand battery tray, through the access hole in the side panel of the UPS, and attach to the ground stud in the UPS cabinet. Hardware is provided on each ground stud.
14. If installing additional battery cabinets, repeat Steps 2 through 13 to join each additional battery cabinet; otherwise, proceed to Step 15.

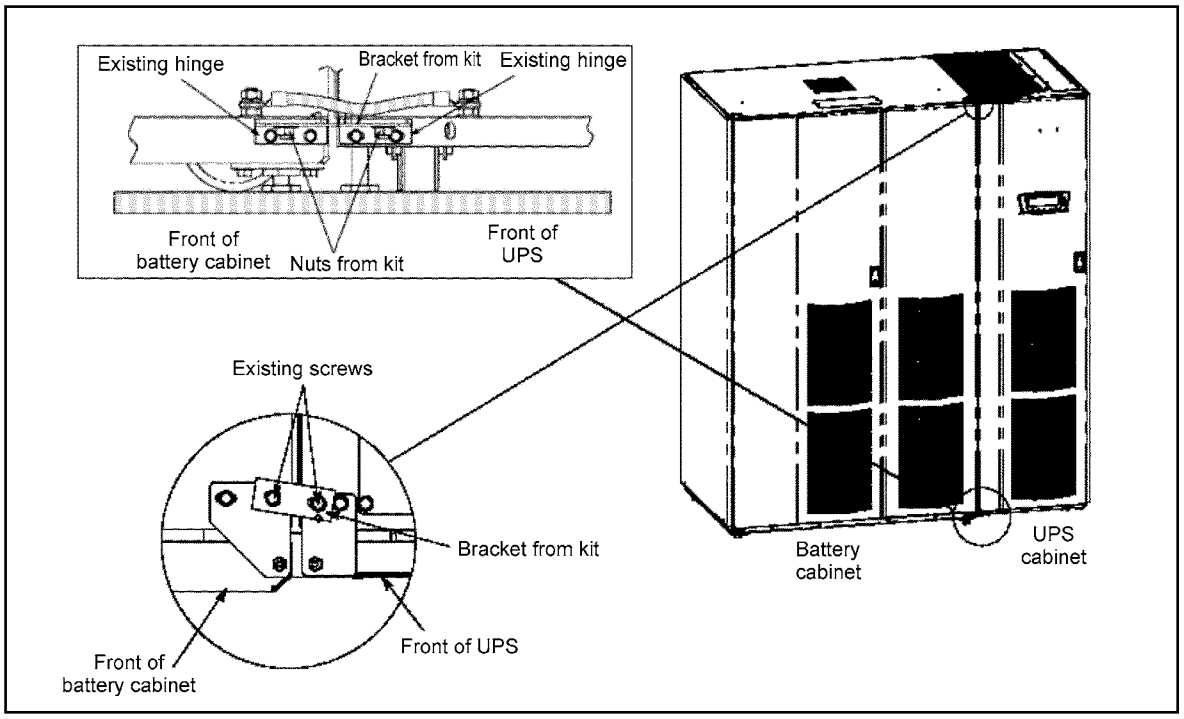


Figure 13. UPS to battery cabinet attaching brackets.

15. If not already installed, mount the hanger brackets to the top left side of the last battery cabinet using M4 screws.
16. If not already installed, hang the side panel on the hanger brackets and align with the front and rear of the battery cabinet.
17. If not already secured, secure the side panel at the bottom using M4 hex head screws previously removed.

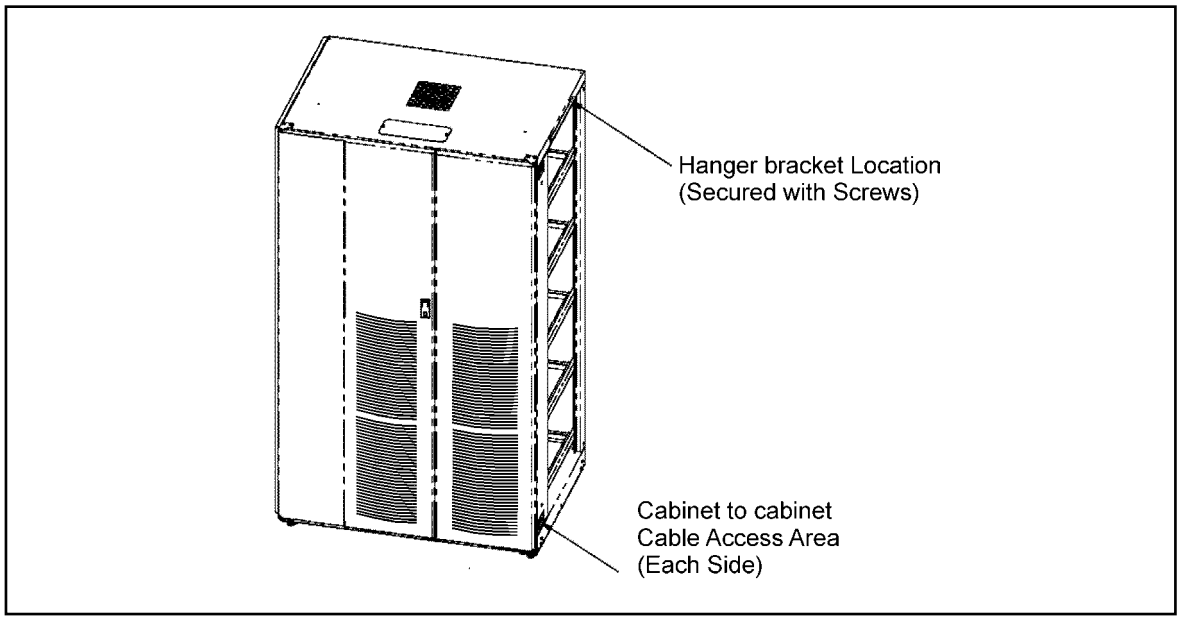


Figure 14. Battery cabinet hanger brackets.

4.3.2 Integral battery cabinet electrical connections

All battery cabinets will arrive at the site with each battery connection string electrically disconnected. If you are installing more than one battery cabinet, the battery cabinet adjacent to the UPS will be the only cabinet directly connected to the UPS.

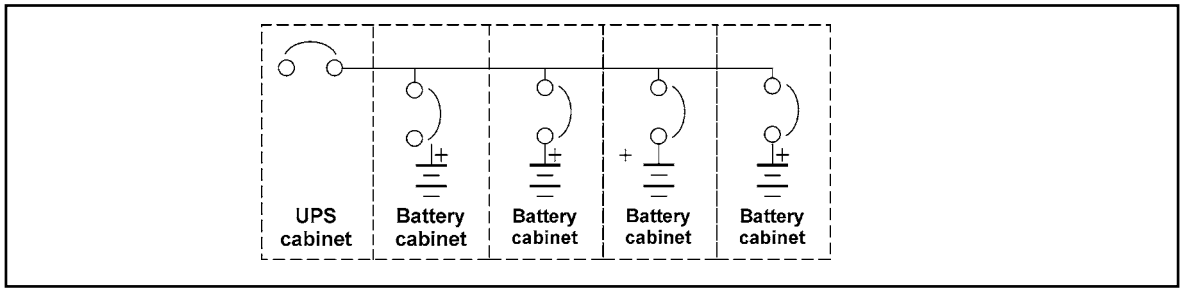


Figure 15. General battery cabinet wiring installation.

Use this procedure to wire an integral battery cabinet to the UPS cabinet:

1. Locate the battery cabinet-to-battery cabinet breaker sensing cable in the first battery cabinet. Route this connector into the cabinet to the immediate left and mate with the matching connector in that cabinet.

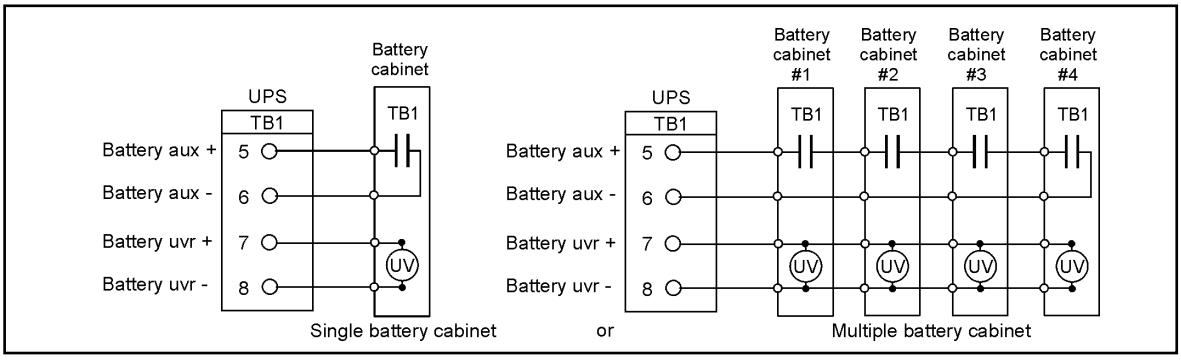


Figure 16. Battery auxiliary and UVR wiring.

Note!

Install the control wiring in separate conduit from the power wiring. The installation cable should have double insulation and rated at Uo/U = 300/500 volts, 1.5 mm² minimum (e.g. MMJ type or equivalent).

Terminal TB1	Name	Description
1	CB1 Aux switch NC	Aux. battery breaker dry contacts. Not used.
2	CB1 Aux switch COM	
3	CB1 Aux switch NO	
4	CB1 Aux switch NO	Contacts used to indicate whether UPS battery breaker or disconnect is open or closed.
5		
6	Battery URV +	Internal connection to UVR coil.
7	Battery URV -	
8	CB1 Aux switch NC	Aux. battery breaker dry contact. Not used.
9	CB1 Aux switch COM	Contacts used to indicate whether UPS battery breaker or disconnect is open or closed.
10	Jumper	Single or multi-cabinet selector
11	Battery URV -	Contacts used to open battery breaker or disconnect.
12	Battery URV +	

(Aux. contacts are rated as follows: 240VAC @ 15A / 125VDC @ 0.3A / 250VDC @ 0.15A)

Table 3. TB1 interface connections in the battery cabinet.

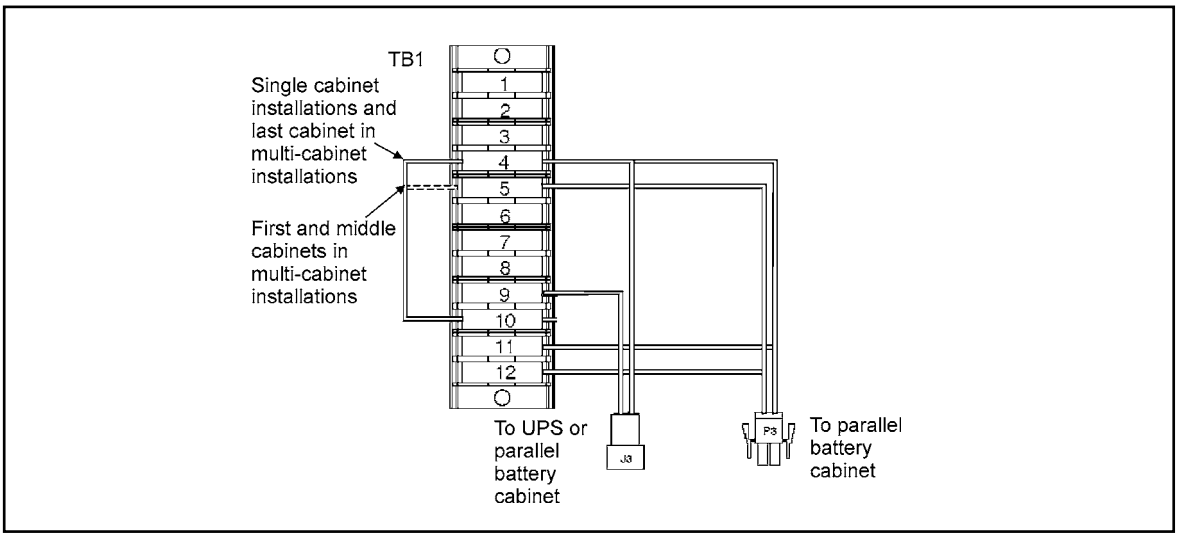


Figure 17. TB1 interface wiring installation.

2. Locate the battery wiring harness under the bottom tray in the first battery cabinet. Route this harness into the cabinet to the immediate left and connect to the (+) lead to the (+) battery terminal and the (-) lead to the (-) battery terminal.
3. Repeat Steps 1 and 2 for each battery cabinet, and then proceed to Step 4.
4. Locate the UPS-to-battery cabinet breaker sensing cable inside the first battery cabinet. Mate the connector on this cable with the matching connector in the cabinet. Route the other end of this cable into the UPS cabinet and connect to terminal strip TB2.
5. An UPS-to-battery wiring harness is supplied inside the first battery cabinet. Connect and route cables from positive (+) and negative (-) terminals in the bottom of the first battery cabinet into the UPS cabinet and connect the (+) lead to terminal E4 (+) and the (-) to terminal E5 (-).

6. After making sure that all battery breakers are in the OFF position, connect the string of battery trays together by mating the loose red connector from each tray to the fixed black connector mounted on the front edge of the tray above. Connect top and bottom tray connectors to mating cabinet connectors to complete battery string connections.
7. Repeat Step 6 for each battery cabinet, and then proceed to Step 8.
8. Secure all battery cabinets by closing and latching the doors.
9. Secure the UPS by reinstalling safety shields and closing and latching the doors.

4.3.3 Separate battery cabinet Installation

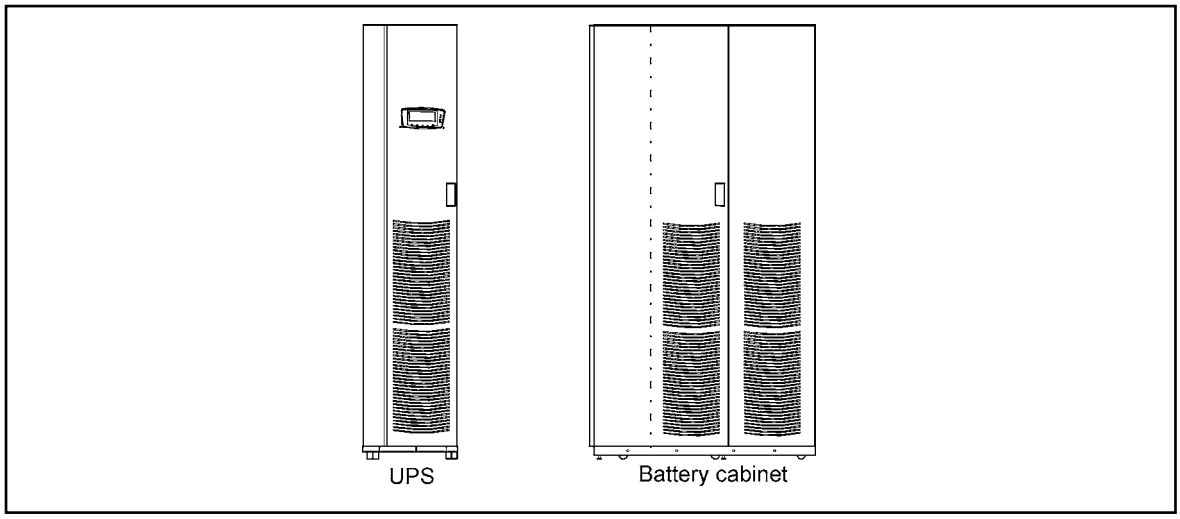


Figure 18. UPS 40-80 kVA with Separately Located Large Battery Cabinet.

Note!

UPS 40-80 kVA are delivered with (4) ferrite rings for battery cables and (2) ferrite clips for control cables. Those should be installed both at the UPS cabinet end to improve the EMC according to EU directives.

Use this procedure to install a separately located battery cabinet.

1. Make sure that the UPS is properly installed and secured with its levelling feet.
2. Roll the battery cabinet to the area where the battery cabinet is to be installed and level the cabinet with the levelling screws.
3. Remove the field kit. The field kit is attached with cable ties to the frame inside the door. Retain the field kit for later use.
4. If installing more than one battery cabinet, proceed to Step 5; otherwise, proceed to electrical connections.
5. Remove the cosmetic cover and hanger brackets from the appropriate side or sides of the battery cabinets, depending on the position of the cabinets. Save covers, screws, and brackets for later reuse.
6. Roll the battery cabinet to be joined to an area near the appropriate side of the first battery cabinet.
7. Push the battery cabinet to be joined towards the first battery cabinet until the doors are flush with each other. Level the cabinets with the levelling screws.

8. Two cabinet attachment brackets are provided for securing each cabinet at the top and bottom. A flat bracket joins the top of the cabinets and a larger flat bracket joins the cabinets at the bottom. Attach the flat bracket to the cabinet tops first.

9. Remove the left-hand and right-hand screws from the adjacent top door hinges of the battery cabinets. Align the holes in the small flat bracket from the field kit over these screw holes. Replace the screws in the hinges, securing the bracket to the cabinets.

10. Locate the large flat bracket from the field kit. Place the bracket over the bolts on the bottom side of the adjacent lower hinges on the battery cabinets.

11. Secure the bracket to the hinges with hardware from the field kit.

12. Route the ground wire (from the field kit) from the ground stud in one battery cabinet, under the lower battery tray and through the cabinet to cabinet cable access area in the side of the cabinets, and attach to the ground stud in the other battery cabinet. Hardware is provided on each ground stud.

13. If installing additional battery cabinets, repeat Steps 5 through 12 to join each additional battery cabinet; otherwise, proceed to Step 15.

14. If not already installed, mount the hanger brackets to the top appropriate side of the last battery cabinet using M4 screws.

15. If not already installed, hang the side panel on the hanger brackets and align with the front and rear of the battery cabinet.

16. If not already secured, secure the side panel at the bottom using M4 hex head screws previously removed.

4.3.4 Separate Battery Cabinet Electrical Connections

Use this procedure to wire a separately located battery cabinet to the UPS cabinet. All battery cabinets will arrive at the site with each battery connection string electrically disconnected. If you are installing more than one battery cabinet, the first battery cabinet will be the only cabinet directly connected to the UPS.

1. Locate the battery breaker sensing cable in the right-hand battery cabinet. Route this connector into the cabinet to the immediate left and mate with the matching connector in that cabinet.
2. Locate the battery wiring harness under the bottom tray in the right-hand battery cabinet. Route this harness into the cabinet to the immediate left and connect to the (+) lead to the (+) battery terminal and the (-) lead to the (-) battery terminal.
3. Repeat Steps 1 and 2 for each battery cabinet, and then proceed to Step 4.
4. Refer to the wiring diagram to connect the external wiring from the first battery cabinet to the UPS cabinet.
5. Locate the UPS-to-battery cabinet breaker sensing cable inside the first battery cabinet. Mate the connector on this cable with the matching connector in the cabinet. Route the other end of this cable through conduit (top or bottom entry) to UPS cabinet and connect to terminal strip TB2.
6. Connect and route cables from positive (+) and negative (-) terminals in the bottom of the first battery cabinet through conduit (top or bottom entry) to UPS cabinet terminals E4 and E5.

7. After making sure that all battery breakers are in the OFF position, connect the string of battery trays together by mating the loose red connector from each tray to the fixed black connector mounted on the front edge of the tray above. Connect top and bottom tray connectors to mating cabinet connectors to complete battery string connections.
8. Repeat Step 7 for each battery cabinet, and then proceed to Step 9.
9. Secure all battery cabinets by closing and latching the doors.
10. Secure the UPS by reinstalling safety shields and closing and latching the doors.

A battery disconnect switch is recommended, and may be required by local codes when batteries are separately located. The battery disconnect switch may be supplied as an accessory, and should be installed between the battery and the UPS.

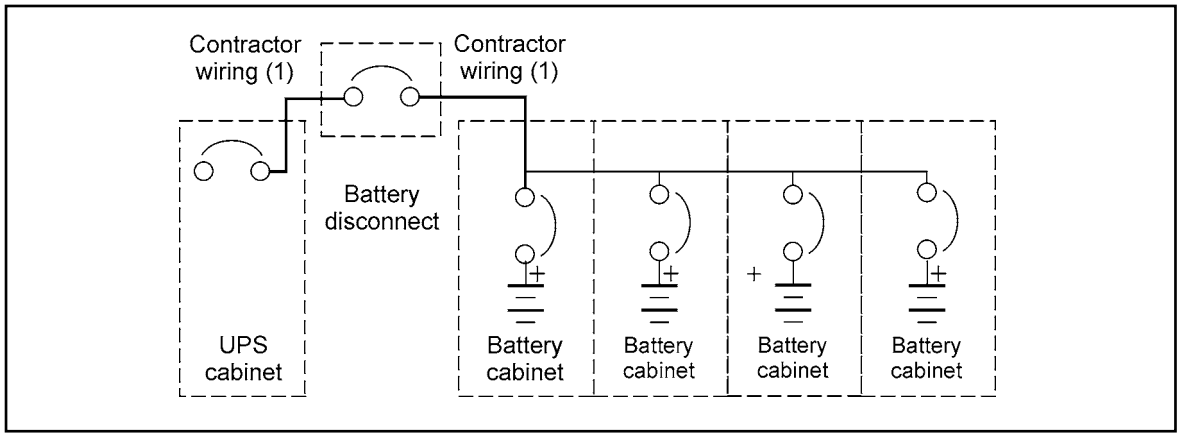


Figure 19. Battery cabinets located separately from the UPS.

4.4 Battery racks

Contact the local office or agent authorised by the manufacturer for rack installed batteries and battery disconnect device as shown in the previous figure.

Use the battery cabinet installation section as a reference for the wiring instructions.

Note!

Battery racks made from metal must be either connected to the protective conductor or insulated from the battery and the place of the installation (EN 50272-2).

5 UPS communication interface

The UPS has a standard, factory-installed XSlot communication bay with two slots. An optional second bay is available, providing two additional slots. Communications XSlot option cards are hot pluggable and quickly installed at the front of the unit.

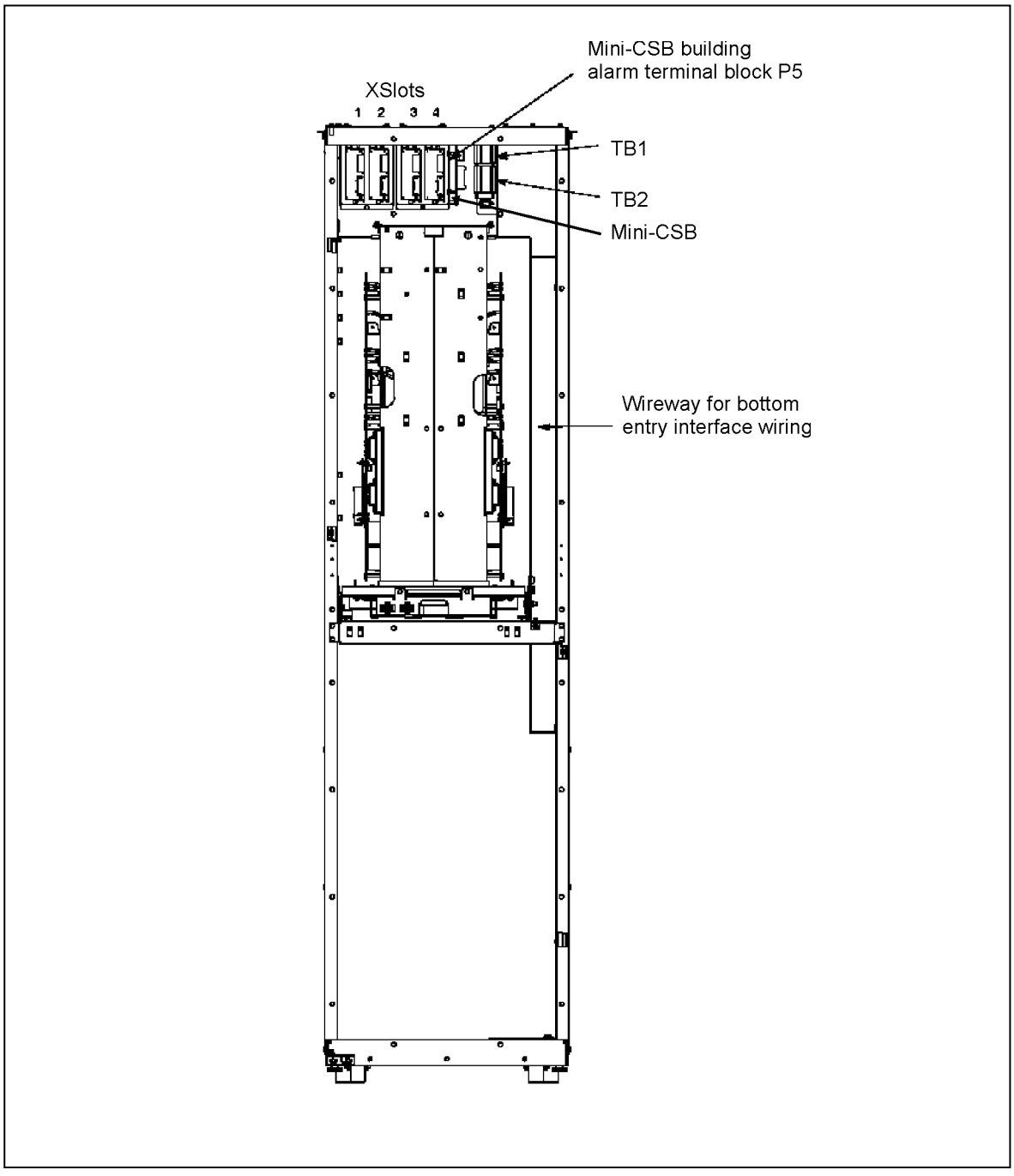


Figure 20. Communication interface location.

5.1 XSlot communication

The UPS is compatible with the following XSlot cards. Refer to the manual supplied with the X-Slot card for user instructions.

- **ConnectUPS -X Web/SNMP/Hub Card** - provides remote monitoring through a Web browser interface, e-mail, and a network management system (NMS) using SNMP; connects to a twisted-pair Ethernet (10/100BaseT) network. It has a built-in switching hub that allows three additional network devices to be connected to the network without the requirement of additional network drops.
- **Relay Interface Card (AS/400)** - has isolated dry contact relay outputs for UPS status: Utility failure, Low battery, UPS alarm/OK, or On bypass when interfacing with IBM® AS/400 computers, other relay connected computers, and industrial applications.
- **Modbus Card** - provides direct integration of UPS information to a Building Management System (BMS) using the Modbus RTU protocol.
- **Modem Card** - provides remote notification and monitoring using modem communication directly to 7/24 monitoring centres. Provided as part of the premium service package to customers.
- **Hot Sync Card** - the parallel interface card

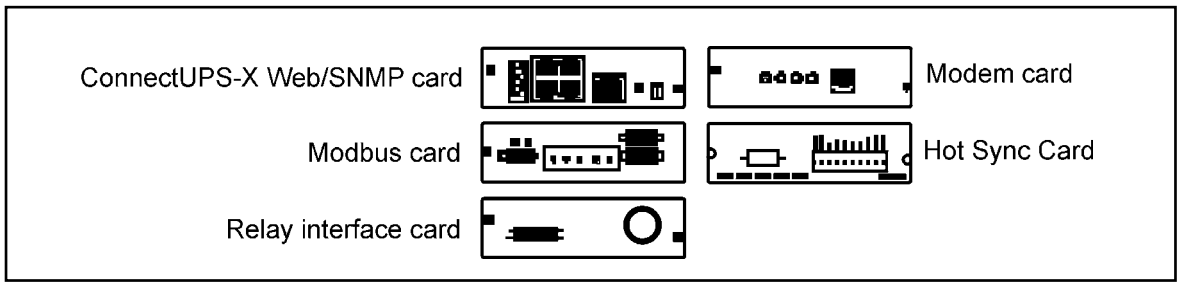


Figure 21. Optional XSlot Cards.

Facility planners or customer must provide LAN and telephone drops, for use with XSlot connectivity cards.

5.1.1 Wiring installation for XSlot connections

It is recommended that the control cables and power cables be installed on separate trays. Where control cables will cross power cables make sure they are arranged at an angle as near to 90 degrees as possible.

All control cables shall preferably be shielded. If the shield is grounded, this shall take place on only one end of the cable.

The installation procedure is following:

1. If not already installed, install LAN and control wire drops.
2. Unfasten front door latch and swing door open.
3. Remove XSlot wire entry conduit landing plate to drill or punch conduit holes.
4. Reinstall conduit landing plate and install conduit.
5. Route and install LAN and other control cables to appropriate X-Slot cards.
6. Close door and secure with latch.
7. Refer to the manual supplied with the XSlot card for user instructions

The procedure for connecting the control cables is the following:

1. Remove the front cover by lifting the cover from the bottom outwards by releasing the retaining clip. It's located in the bottom part of the bezel.
2. Locate the control terminal or XSlot module where you want to install the communications cable.

5.1.2 LanSafe

LanSafe continuously monitors single UPS systems and automatically notifies users locally and remotely of any events. The LanSafe offers user-friendly, custom views for monitoring status, metering information and the internal workings of UPS. Each view provides a different level of available data, allowing various user groups to select the most compelling and useful view for their specific needs.

For information on installation and operation, refer to the Software Suite CD-ROM shipped with the UPS. The LanSafe requires ConnectUPS or Single-Port Card to interface with the UPS unit. Refer to the manual(s) supplied with the XSlot card for user instructions.

5.2 Input and output connections

The facility's alarm system contacts can be connected to two inputs in the UPS. The UPS uses these inputs to monitor the building alarms in addition to the UPS status. Regardless of assignment, alarms display as Building Alarm 1 and Building Alarm 2, on the Control Panel Display Screen.

One alarm contact is provided for connection to equipment at the facility, such as a light, an audible alarm, or a computer terminal. The equipment connected to these contacts alert you to an UPS alarm.

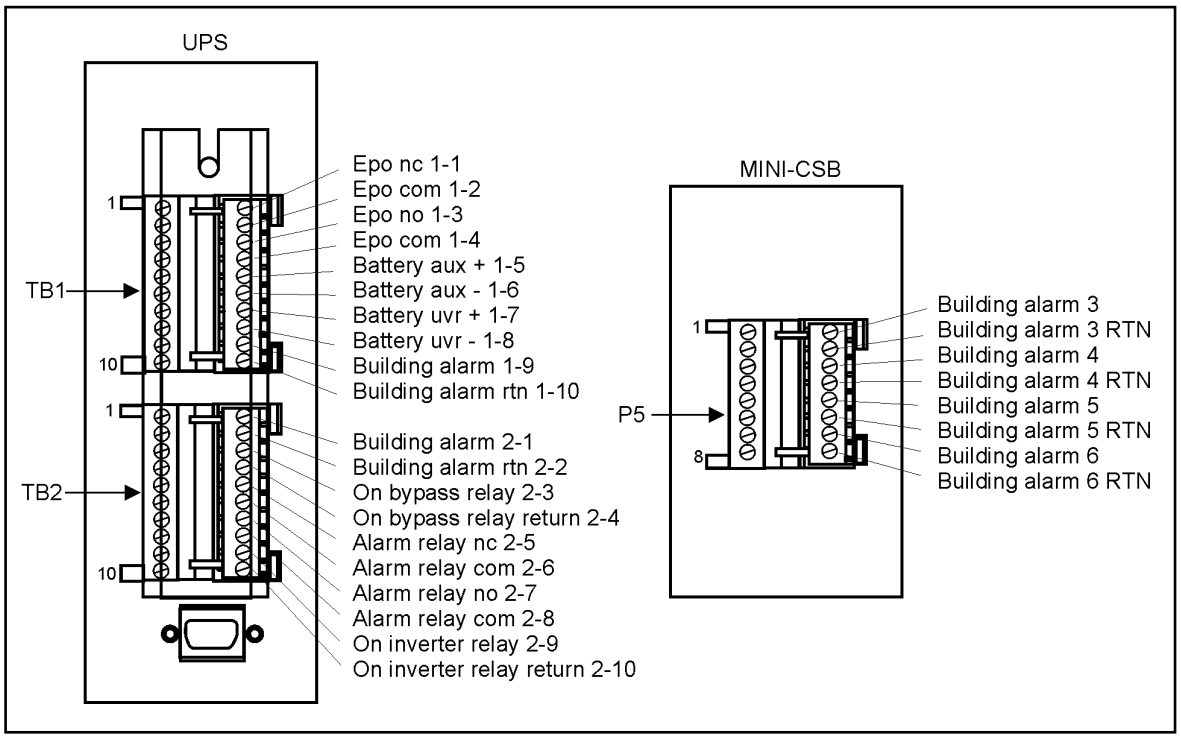


Figure 22. TB1, TB2, TB5 (optional) input and output connections.

Terminal TB 1	Name	Description
1	External EPO NC	Normally Open and Normally Closed dry contacts used to activate EPO of UPS from a remote switch.
2	External EPO Com	
3	External EPO NO	
4	External EPO Com	
5	Battery Aux +	Contacts used to indicate whether UPS battery breaker or disconnect is open or closed
6	Battery Aux -	
7	Battery Uvr +	Contacts used to open battery breaker or disconnect
8	Battery Uvr -	
9	Building Alarm	Programmable UPS alarm. Activated by a remote dry contact closure.
10	Building Alarm Return	

Table 4. TB1 terminal interface connections.

Note!

A jumper wire must be connected between pins 8 and 9 on TB1, if the normally closed EPO contact is not used.

Terminal TB 2	Name	Description
1	Building Alarm	Programmable UPS alarm. Activated by a remote dry contact closure.
2	Building Alarm Return	
3	On Bypass relay	Normally Open contact closes when UPS is on bypass
4	On Bypass Relay Return	
5	Alarm Relay NC	General purpose Normally Open and Normally Closed relay contacts.
6	Alarm Relay Com	
7	Alarm Relay NO	
8	Alarm Relay Com	
9	On Inverter Relay	Normally Open contact closes when output contactor closes
10	On Inverter Relay Return	

Table 5. TB2 terminal interface connections.

5.2.1 Wiring procedure

Install the interface wiring in separate conduit from the power wiring. The installation cable should have double insulation and rated at Uo/U = 300/500 volts, 1.5 mm^2 minimum (e.g. MMJ type or equivalent).

Note!

All building alarm inputs or remote features require an isolated normally open contact or switch connected between the alarm input and common terminal as shown. All control wiring and relay and switch contacts are customer provided.

5.2.2 To install TB1 wiring to connections:

1. Be sure the UPS system is turned off and all power sources are removed.
2. If not already open, unfasten front door latch and swing door open.
3. Remove screws securing internal panel covering TB1 and TB2 terminal blocks at the top of the UPS cabinet.

4. If installing interface wiring from the bottom of the cabinet, proceed to step 5; otherwise, proceed to step 7.
5. Remove screws securing top internal safety shield panel and open panel to gain access to bottom entry wire way.
6. Remove screws securing bottom internal safety shield panel and remove panel to gain access to bottom entry conduit landing plate.
7. Remove UPS cabinet top or bottom wire entry conduit landing plate to drill or punch conduit holes.
8. Reinstall conduit landing plate and install conduit.
9. Locate appropriate terminals for wiring.
10. Route and connect wiring.
11. When all wiring is complete, reinstall safety shield panels removed in previous steps.
12. Close door and secure with latch.

5.2.3 To install TB2 wiring to connections:

1. Be sure the UPS system is turned off and all power sources are removed.
2. If not already open, unfasten front door latch and swing door open.
3. Remove screws securing internal panel covering TB1 and TB2 terminal blocks at the top of the UPS cabinet.
4. Locate the appropriate terminals.
5. If battery cabinets are installed attached to the UPS cabinet, proceed to step, 6; if battery cabinets are installed separated from the UPS cabinet, proceed to step 9.
6. Route UV trip and Aux wiring harness supplied with the battery cabinet from the battery cabinet to the UPS cabinet.
7. Proceed to step 14.
8. If installing interface wiring from the bottom of the cabinet, proceed to step 9; otherwise, proceed to step 11.
9. Remove screws securing top internal safety shield panel and open panel to gain access to bottom entry wire way.
10. Remove screws securing bottom internal safety shield panel and remove panel to gain access to bottom entry conduit landing plate.
11. Remove UPS cabinet top or bottom wire entry conduit landing plate to drill or punch conduit.

Note!

Auxiliary battery and UVR trip wiring between UPS and battery cabinet must be installed and protected with conduit.

12. Reinstall conduit landing plate and install conduit.
13. Route UV trip and Aux wiring from the battery cabinet to the UPS.
14. Route and connect wiring to TB2 terminals.
15. When all wiring is complete, reinstall safety shield panels removed in previous steps.
16. Close door and secure with latch.

5.3 Remote emergency power off

A remote EPO switch can be used in an emergency to shutdown the UPS and remove power to the critical load from a location away from where the UPS is installed.

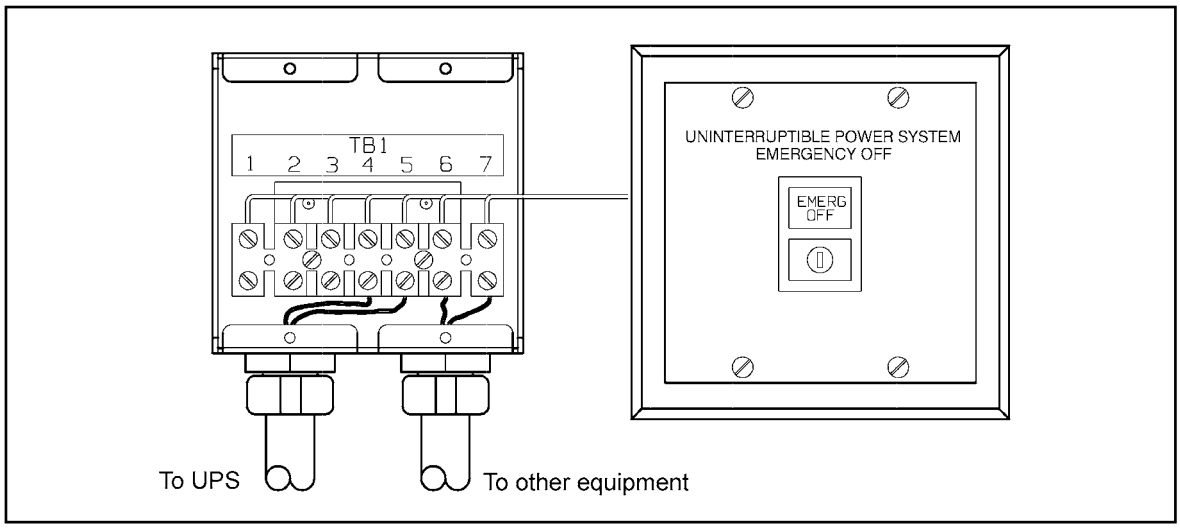


Figure 23 An example of Remote Emergency Power Off station.

5.3.1 Installation

1. Securely mount the Remote EPO station. Recommended locations include operator‘s consoles or near exit doors.
2. Be sure the UPS system is turned off and all power sources are removed.
3. If not already open, unfasten front door latch and swing door open.
4. Remove screws securing internal panel covering TB1 and TB2 terminal blocks at the top of the UPS cabinet.
5. If installing interface wiring from the bottom of the cabinet, proceed to step 6; otherwise, proceed to step 8.
6. Remove screws securing top internal safety shield panel and open panel to gain access to bottom entry wire way.
7. Remove screws securing bottom internal safety shield panel and remove panel to gain access to bottom entry conduit landing plate.
8. Locate appropriate terminals for wiring.
9. Route and connect wiring.
10. Connect jumper wire between pins 8 and 9 on TB1, if the normally closed EPO contact is not used.

From remote EPO station(s)	To customer interface (TB1 in UPS cabinet)	Remarks
TB 1-4	TB1-3	Twisted (2) wires
TB 1-5	TB1-4	

Table 6. Remote EPO Wire Terminations.

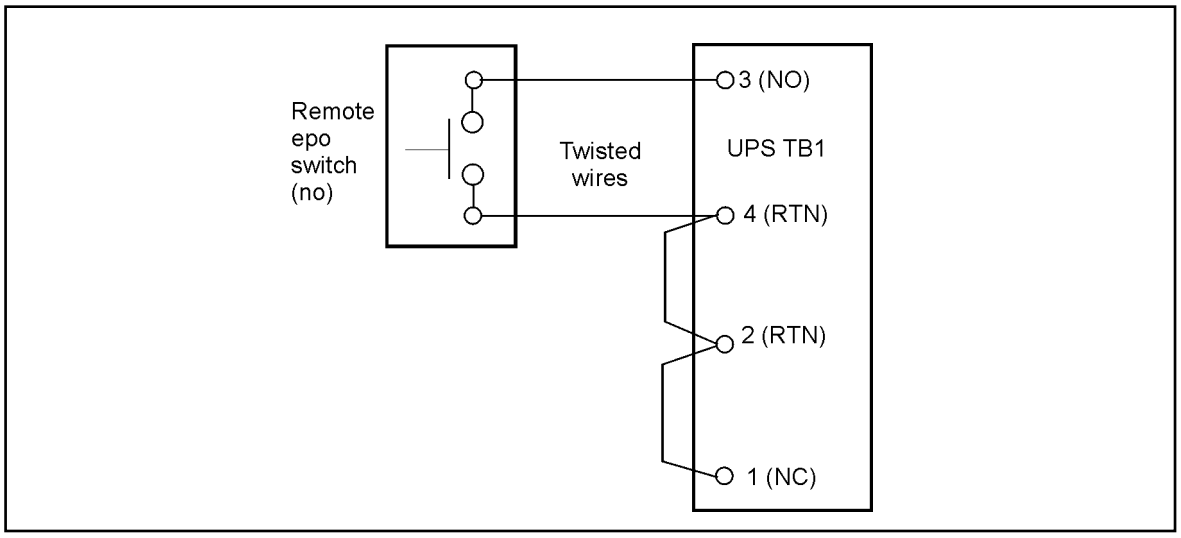


Figure 24. Remote EPO wiring diagram.

11. If you are installing multiple Remote EPO stations, wire additional stations in parallel with the first Remote EPO.

12. If required, install wiring from the Remote EPO station to trip circuitry of upstream protective devices. A normally open contact is provided between terminals 6 and 7 of remote EPO.

13. When all wiring is complete, reinstall safety shield panels removed in previous steps.

14. Close door and secure with latch.

6 Control Panel

The control panel, located on the front door of the UPS, contains LCD screen and pushbutton switches to control the operation of the UPS, and to display the status of the UPS system.

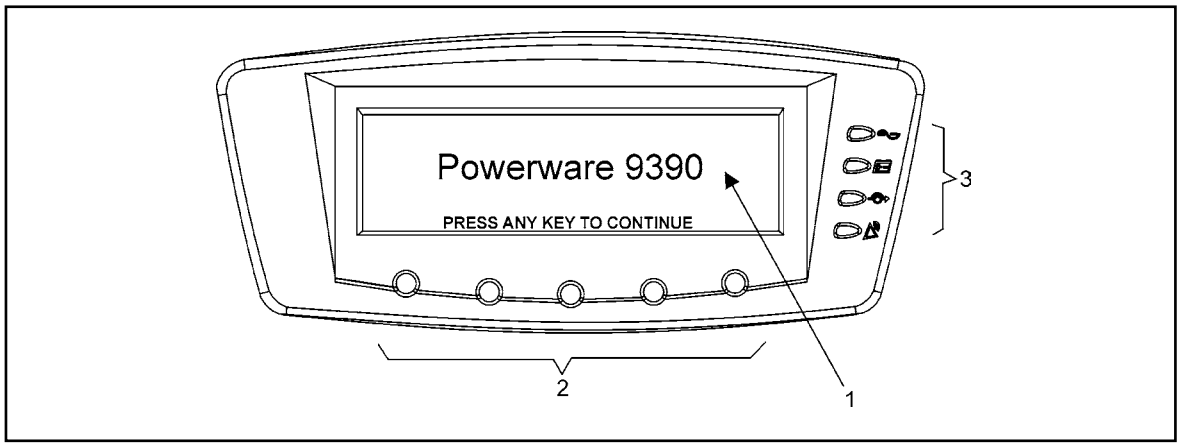


Figure 25. UPS Control panel.

The Control Panel consists of the following:

- A Liquid Crystal Display (LCD) screen (1)
- A horizontal row of pushbutton switches (2)
- A vertical column of status indicators (3)

When the unit powers up, the screen displays the Powerware logo. To advance to the Main menu and Mimic screen, press any Control Panel pushbutton once. After approximately 30 minutes on inactivity, the display screen darkens. To restore the screen, press any pushbutton once.

6.1 Identification of the display areas

The LCD screen on the Control Panel provides an operator interface with the UPS system.

You can use the LCD screen and the pushbuttons to:

- Look at a log of UPS events (alarms, notices, and commands)
- Monitor UPS operation
- Set UPS parameters
- Control UPS operation

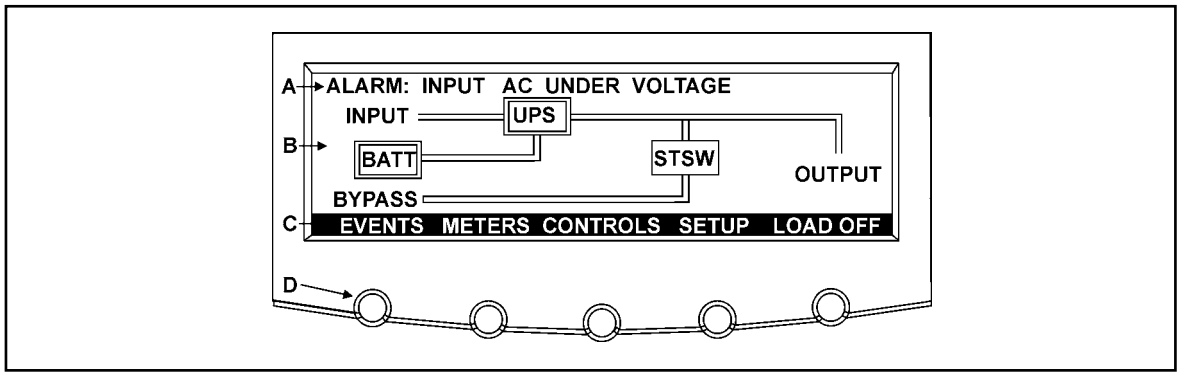


Figure 26. Display areas of the LCD screen.

A The **UPS status area** automatically scrolls between the Powerware model number, current date and time, active alarms, active notices, and load percent and battery run time for the UPS. Shown is a typical alarm message.

B The **information area** contains data about UPS status and operations. Select a menu option to display the desired information.

C The menu bar lists the titles of the available screens. To select a screen, press the pushbutton underneath the desired screen.

D Navigation pushbutton switches. Function changes depending on the screen displayed. Use to select menu screens or scroll through available screens. Designated function is indicated on the LCD screen above the respective pushbutton.

6.2 Main Menu

The UPS Main menu bar allows you to display data in the information area to help you monitor and control UPS operation. The following menus and options are available:

EVENTS Displays the list of Active System Events and a historical log of system events.

METERS Displays performance meters for the system or critical load.

CONTROLS Displays the System Controls screen.

SETUP Allows you to set the display contrast, set the date and time for the time stamp, configure the UPS serial communication ports and view the firmware version numbers.

LOAD OFF De-energizes the critical load and powers down the UPS.

↵ Returns to Main menu and Mimic screen from the Events, Meters, Controls, or System Setup screens. Returns to the main System Setup Level screen from a setup sub-menu.

6.2.1 Event Screens

Press the EVENTS pushbutton on the Main Menu bar or History Menu bar to display a listing of all system events that are currently active. The most recent event is listed first. As events clear, they are removed from the Active System Events listing.

To scroll through the events, press the UP or DOWN pushbuttons on the menu bar.

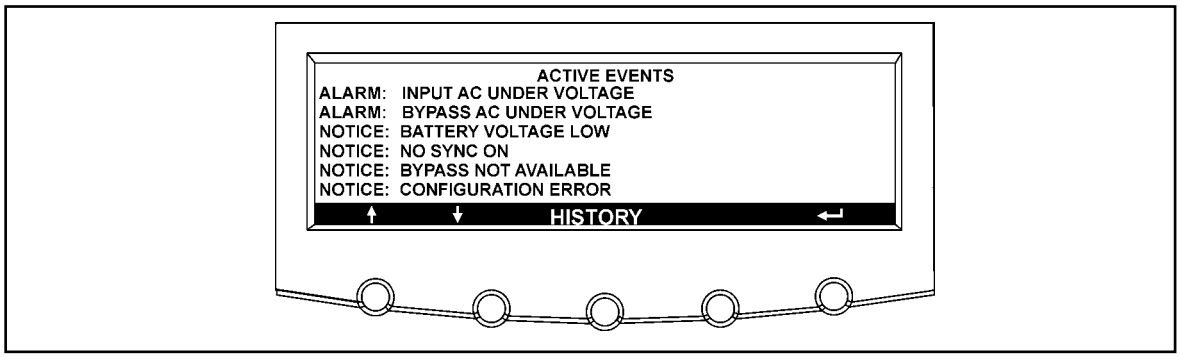


Figure 27. Active Events screen.

Press the HISTORY pushbutton on the Active Events Menu bar to display the History Log. The History Log lists up to the 500 system events in chronological order, with the most recent event listed last.

The History Log lists the events in the following groups:

- User and service status
- User instruction
- User alarm
- Check UPS
- Schedule service
- UPS shutdown
- Service alarm

The end of the log, i.e the most recent events, appears when you display the screen, and you must scroll upward to view older event listings. To scroll through the events, press the UP or DOWN pushbuttons on the menu bar. To return to the Active Events screen, press the EVENTS pushbutton on the menu bar.

6.2.2 Meter Screens

Press the METERS pushbutton on the Main Menu bar to display the Unit Meter screens. To scroll through the meter screens, press the UP or DOWN pushbuttons on the menu bar. The current UPS readings are displayed in the information area of the screen.

The **Input screen** shows input voltage (phase-to-phase), output current (each phase), and frequency, of the incoming utility source, followed by the kVA, kW, and power factor measurements.

The **Bypass screen** shows the bypass input voltage (phase-to-neutral), output current (each phase), and frequency, of the incoming utility source, followed by the kVA, kW, and power factor measurements.

The **Battery screen** displays the battery voltage (Vdc), the battery current (Idc), battery life, and the minutes of battery time remaining. When battery life decreases to less than 20 %, Check Battery is displayed.

The **Output screen** shows output voltage (phase-to-neutral), output current (each phase), and frequency, being supplied by the UPS, followed by the kVA, kW, and power factor measurements.

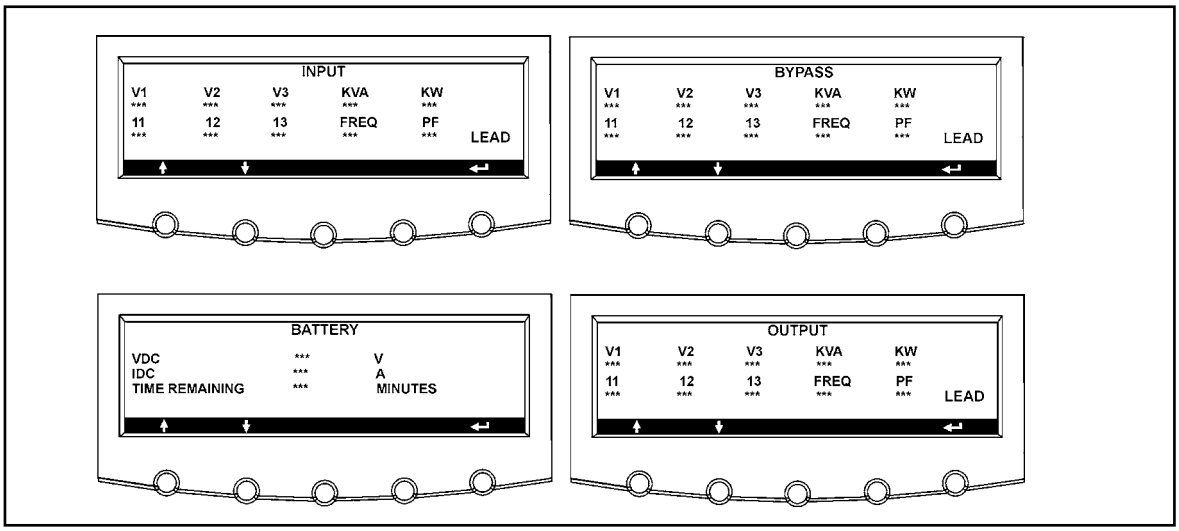


Figure 28 Input, bypass, battery and output meter screens.

The **Output Current Screen** displays a real-time bar graph of the output current of the UPS. The graph shows the current for each phase.

6.2.3 Controls screen

Press the CONTROLS pushbutton on the Main Menu bar to display the System Controls screen. LOAD OFF, normal operation, transfer to bypass, charger control, and power module start-up and shutdown functions are controlled from this screen. In addition, the screen displays the current status of the UPS and indicates whether the UPS is in Maintenance Bypass or Bypass, and the state of the Power Module (PM) and battery charger.

Use the RIGHT or LEFT pushbuttons on the menu bar to toggle the menu bar functions between System Controls Screens 1 and 2.

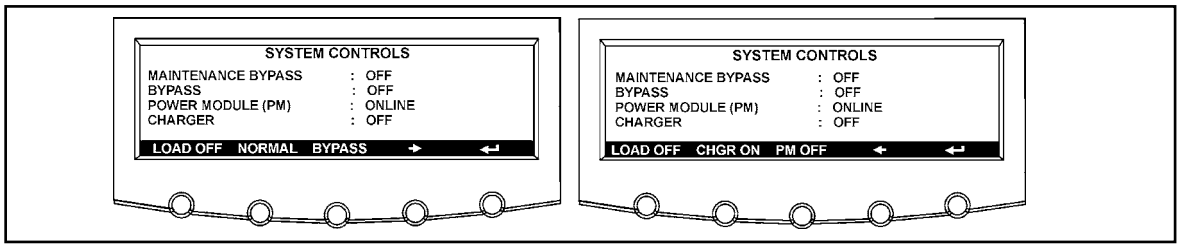


Figure 29. System Controls screens 1 and 2.

The CHGR pushbutton switch, on the System Controls screen, toggles the charger function On and Off. The PM pushbutton switch toggles the Power Module function On and Off.

6.2.4 Setup screen

Press the SETUP pushbutton on the Main Menu bar to display the System Setup Level 0 Screen. This screen can be used to set the screen contrast, show the firmware versions installed, identify the unit type, and enter a password to access Level 1 functions. No password is necessary to access Level 0 functions.

Use the UP or DOWN pushbuttons to highlight the setup function screen desired, then press the SELECT pushbutton to display the function screen.

A password is required to access the Level 1 functions. To enter the password, select ENTER PASSWORD from the System Setup Level 0 menu to display the Enter Password screen. Use the LEFT or RIGHT pushbuttons to select the password character position. Use the UP or DOWN pushbuttons to change the password character. The default password is L1. Once the password is entered, press the DONE pushbutton.

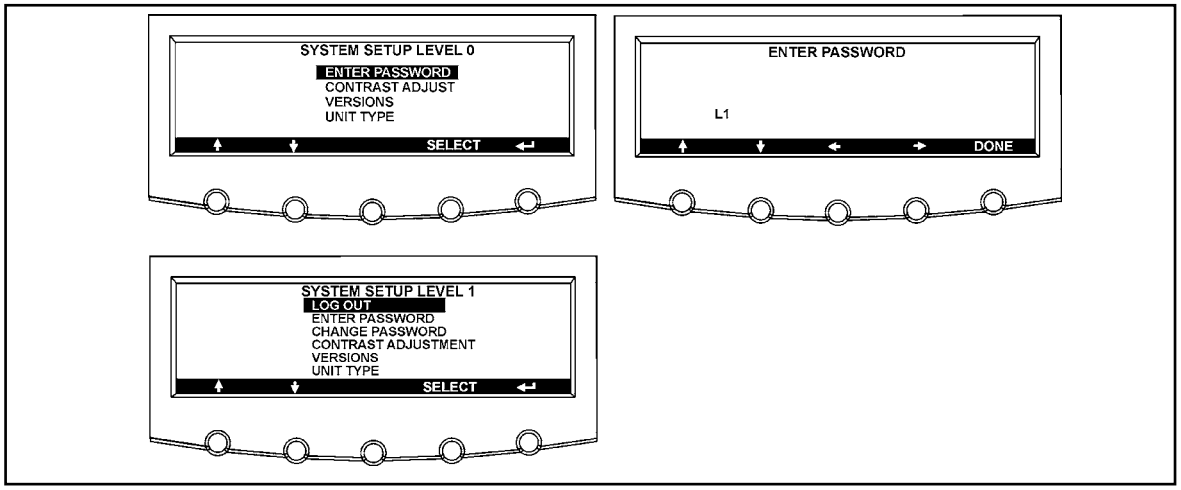


Figure 30. System Setup Level 0, enter password, and System Setup Level 1 screens.

The System Setup Level 1 screen can be used to set the UPS date and time, the serial ports, change the Level 1 password, and logout of Level 1. In addition, the Level 0 functions are available. Use the UP or DOWN pushbuttons to highlight the setup function screen desired, then press the SELECT pushbutton to display the function screen.

For example, select COM PORT SETUP from the System Setup Level 1 menu to display the Serial Port Setup screen. This screen allows selection of the serial COM port to set up. Use the UP or DOWN pushbuttons to highlight the COM port to be set up, then press the SELECT pushbutton. To return to the System Setup screen, press the RETURN pushbutton.

The COM Setup screen is used to change and save the settings for the serial communication ports. The COM port number selected from the Serial Port Setup screen will be displayed. If the changes are not wanted, the ABORT pushbutton may be used to return to the Serial Port Setup screen.

Use the UP or DOWN pushbuttons to highlight the setting to be changed. Use the SELECT pushbutton to toggle through the values for the setting to make the change. Press SAVE or ABORT. Once the action is completed, the Serial Port Setup screen appears.

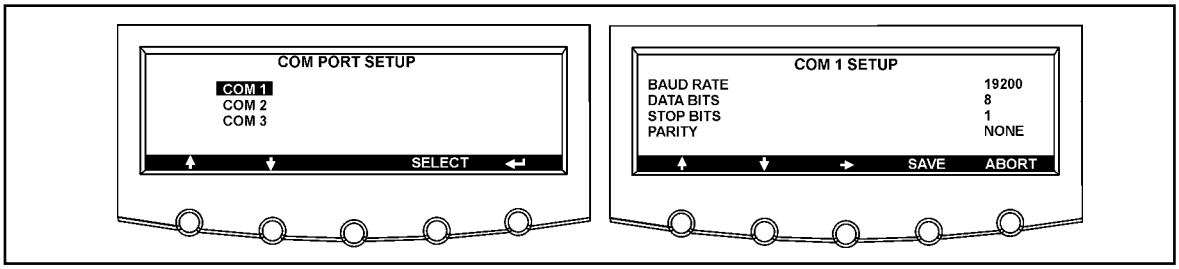


Figure 31. Serial Port Setup Screen at System Setup Level 1.

The Level 1 screen will timeout after 60 minutes, or can be logged out at any time by selecting the LOG OUT function from the menu screen.

6.2.5 Load Off Screen

The Load Off screen appears when the LOAD OFF pushbutton is selected from the Main Menu bar or System Controls Menu bar. This screen allows the LOAD OFF process to be aborted if the LOAD OFF pushbutton was pressed accidentally.

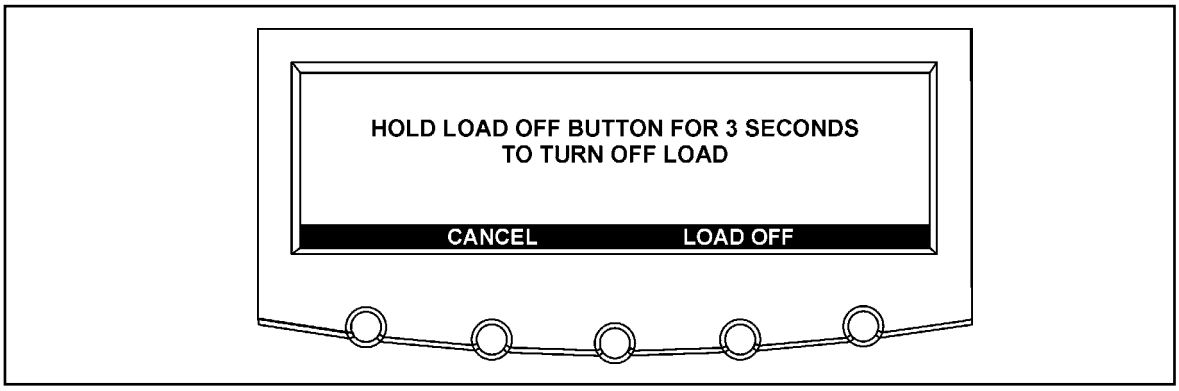


Figure 32. Load off screen.

6.3 Mimic Screen

To select the Mimic screen from the Events, Meters, Controls, or Setup screens, press the RETURN pushbutton on the current menu bar. The Mimic screen shows the internal components of the UPS cabinet and a real-time graphical representation of the operating status of the system.

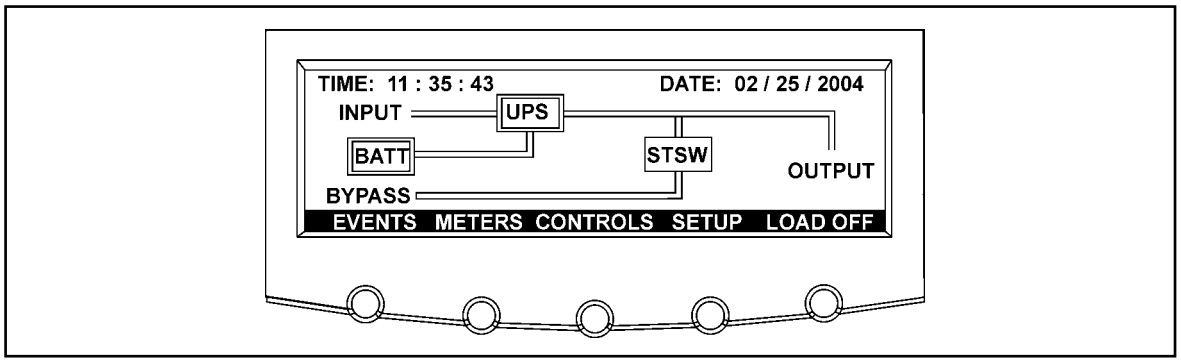


Figure 33. Mimic screen and Main Menu.

6.4 Status Indicators

The four symbols on the left side of the control panel are **status indicators.** They are coloured light emitting diode (LED) lamps, and they work in conjunction with the alarm horn to let you know the operating status of the UPS.

Normal

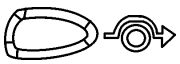
This green indicator is illuminated when the UPS is operating in Normal mode. The Power Module is supplying power to the critical load.

The indicator flashes when the system needs attention. The LCD screen shows all active notices. Some notices may be accompanied by an audible horn. To silence the horn, press any Control Panel pushbutton once. The indicator may be flashing while other indicators are illuminated. The indicator continues to flash until acknowledged by pressing any Control Panel pushbutton once.

Battery

This yellow indicator is illuminated when the UPS is operating in Battery mode. Because Battery mode is a normal condition of the UPS, the Normal indicator also remains illuminated.

Bypass



This yellow indicator is illuminated when the UPS is operating in Bypass mode. The critical load is supported by the bypass source. The Normal indicator is not illuminated when the system is in Bypass mode.

Alarm

This red indicator is illuminated when a situation requires immediate attention. The LCD screen shows the highest priority active alarms. All alarms are accompanied by an audible horn. To silence the horn, press any Control Panel pushbutton once. The Alarm indicator may be illuminated along with other indicators. The indicator flashes until acknowledged by pressing any Control Panel pushbutton once.

7 Operating instructions

The following procedures provide instructions for operating the UPS system.

7.1 Starting the UPS in Normal Mode

To start the UPS system, perform the following procedure:

1. Close the UPS input feeder circuit breaker.

2. Close UPS Bypass input feeder circuit breaker.

3. Observe UPS Control Panel display screen becoming active as an indication of logic power.

4. Press the **CONTROLS** pushbutton on the Main menu bar. The System Controls screen appears.

5. On the System Controls screen, the Power Module (PM) status should indicate SHUTDOWN.

6. Press the **NORMAL** pushbutton on the System Controls menu bar.

   If Auto Bypass is enabled, the critical load is immediately supplied by the bypass source, in Bypass mode, until the inverter turns on and the UPS transfers to Normal mode. The status indicator on the UPS Control Panel indicates the UPS is in Bypass mode. If Auto Bypass is not enabled, the UPS output remains off until the UPS transfers to Normal mode.

7. Observe the following messages appear sequentially on the Power Module (PM) status line:

   DC STARTING
   INVERTER STARTING
   READY
   ONLINE

   The rectifier and inverter turn on. When the inverter reaches full voltage, UPS output contactor K3 closes and the static switch turns off supplying power to the critical load in Normal mode. It takes approximately 1 minute for the UPS to achieve Normal mode.

8. Close battery breaker any time after INVERTER SYNCING or CLOSE BATTERY appears on the display screen.

9. The UPS is now operating in the Normal mode and the **NORMAL** status indicator is illuminated.

7.2 Starting the UPS in Bypass Mode

If the Inverter Output of the UPS is not available and the critical load needs to be energised, perform the following procedure:

1. Close the UPS input feeder circuit breaker.

2. Close UPS Bypass input feeder circuit breaker.

3. Observe UPS Control Panel display screen becoming active as an indication of logic power.

4. Press the **CONTROLS** pushbutton on the Main menu bar. The System Controls screen appears.

5. On the System Controls screen, the Power Module (PM) status should indicate SHUTDOWN.

6. Press the **BYPASS** pushbutton on the System Controls menu bar. The critical load is immediately supplied by the bypass source, in Bypass mode.

7. The UPS is now operating in the bypass mode and the **BYPASS** status indicator is illuminated.

7.3 Starting the Power Module

To start the Power Module without transferring the critical load to normal, perform the following procedure:

1. Close the UPS input feeder circuit breaker.

2. Close UPS Bypass input feeder circuit breaker.

3. Observe UPS Control Panel display screen becoming active as an indication of logic power.

4. Press the **CONTROLS** pushbutton on the Main menu bar. The System Controls screen appears.

5. On the System Controls screen, the Power Module (PM) status should indicate SHUTDOWN.

6. Press the pushbutton to display System Controls Screen 2.

7. Press the **PM ON** pushbutton on the System Controls menu bar.

8. Observe the following messages appear sequentially on the Power Module (PM) status line:

   DC STARTING
   INVERTER STARTING
   INVERTER SYNCING
   READY

   The rectifier and inverter turn on. When the inverter reaches full voltage, the UPS is ready to transfer to the Normal mode and supply the critical load.

7.4 Transfer from Normal to Bypass Mode

Note!

In Bypass Mode, the critical load is not protected from commercial power interruptions and abnormalities.

To transfer the critical load to bypass mode, perform the following procedure:

1. Press the **CONTROLS** pushbutton on the Main menu bar. The System Control screen appears.

2. Press the **BYPASS** pushbutton on the System Controls menu bar. The UPS switches to Bypass mode and the critical load is immediately supplied by the bypass source. If the bypass source is not available, the power processor remains on and an alarm sounds.

3. The UPS is now operating in the bypass mode and the **BYPASS** status indicator is illuminated.

   The Power Module (PM) status indicates READY. System is now on bypass and UPS power processor remains on.

Warning!

Power is present inside the UPS cabinets.

7.5 Transfer from Bypass to Normal Mode

To transfer the critical load to normal mode, perform the following procedure:

1. Press the **CONTROLS** pushbutton on the Main menu bar. The System Control screen appears.

2. Press the **NORMAL** pushbutton on the System Controls menu bar. The UPS switches to Normal mode. If the power processor is not available, the system remains on bypass and an alarm sounds.

3. The UPS is now operating in the Normal mode and the **NORMAL** status indicator is illuminated.

   The Power Module (PM) status indicates ONLINE.

7.6 Transfer from Normal to Bypass Mode with UPS Shutdown

1. Transfer critical load to bypass by performing procedure in paragraph 7.4.

2. Press the **CONTROLS** pushbutton on the Main menu bar. The System Control screen appears.

3. Press the pushbutton to display System Controls Screen 2.

4. Press the **PM OFF** pushbutton on the System Controls menu bar.

   The Power Module (PM) status indicates SHUTDOWN. The input and output contactors open, the battery breaker or disconnect is tripped, and the Power Module is turned off. The bypass source supplies the critical load.

Warning!

Power is present inside the UPS cabinets.

7.7 UPS and Critical Load Shutdown

To perform maintenance or service on the critical load, shut down power to the load by performing the following procedure:

1. Turn off all equipment that is being powered by the UPS.

2. Perform LOAD OFF procedure contained in paragraph 7.9.

   The input, output, and bypass backfeed contactors open, the battery breaker or disconnect is tripped, and the Power Module is turned off.

Warning!

Power is present inside the UPS cabinets, until the upstream input feeder circuit breaker is opened.

3. Open the UPS input and bypass (if dual feed) feeder circuit breakers.

7.8 Charger Control

To turn the battery charger on or off, perform the following procedure:

1. Press the **CONTROLS** pushbutton on the Main menu bar. The System Control screen appears.

2. Press the → pushbutton to display System Controls Screen 2.

3. Press the **CHARGER ON** or **CHARGER OFF** pushbutton on the System Controls menu bar to toggle the charger on or off.

7.9 Using the LOAD OFF Pushbutton

The LOAD OFF pushbutton from the Main menu bar or the System Controls screen menu bar initiates an UPS Load Off. This pushbutton can be pressed to control the UPS output. The UPS **LOAD OFF** pushbutton de-energizes the critical load and powers down the UPS.

The UPS (including Bypass) remains off until restarted.

To Use the LOAD OFF Pushbutton:

1. Press the **LOAD OFF** pushbutton.

   The Load Off screen appears, providing a choice to proceed with the shutdown or to abort the shutdown.

Note!

All power to the critical load is lost when the LOAD OFF is selected in the following step. You should use this feature only when you want to de-energise the critical load.

2. To shut down the UPS, press **LOAD OFF** from the Load Off screen menu bar, and hold for three seconds. To abort the shutdown, press **CANCEL**.

   When LOAD OFF is selected and held for three seconds, the input, output, and bypass backfeed contactors open, the battery breaker or disconnect is tripped, and the Power Module is turned off.

Note!

Do not attempt to restart the system after Load Off until the cause of the shutdown has been identified and cleared.

3. To restart the UPS after pressing the **LOAD OFF** pushbutton, follow the procedure, in paragraphs 7.1 or 7.2.

7.10 Using the REMOTE EMERGENCY POWER OFF Switch

An UPS Emergency Power Off is initiated by **Remote Emergency Power OFF (REPO)** pushbutton switch. In an emergency, you can use this switch to control the UPS output. The REPO switch de-energises the critical load and powers down the UPS immediately, without asking for verification.

The UPS, including Bypass, remains off until restarted.

To Use the REPO Switch:

Note!

All power to the critical load is lost when the REPO switch is activated in the following step. You should use this feature only when you want to de-energise the critical load.

The following instructions are for the Powerware supplied REPO switch. If a customer supplied REPO switch is used it may not activate in the same manner. If this is the case, refer to the operating instructions provided with the switch.

1. Press the REPO pushbutton switch.

   The input, output, and bypass backfeed contactors open, the battery breaker or disconnect is tripped, and the Power Module is turned off immediately, without asking for verification.

Note!

Do not attempt to restart the system after Load Off until the cause of the shutdown has been identified and cleared.

2. To restart the UPS after using the REPO pushbutton, reset the REPO switch and then follow the procedure, in paragraphs 7.1 or 7.2.

7.11 Using Mechanical Bypass Switch (40-80 kVA)

The operation of the integral MBS is allowed for a trained person only who is familiar with the UPS behaviour and functions. The full UPS wiring diagram with a MBS switch is presented in the installation part of the manual.

Note!

The integral MBS consist of three switches (S2, S3, S4) and failure to understand the correct sequence may drop the critical load.

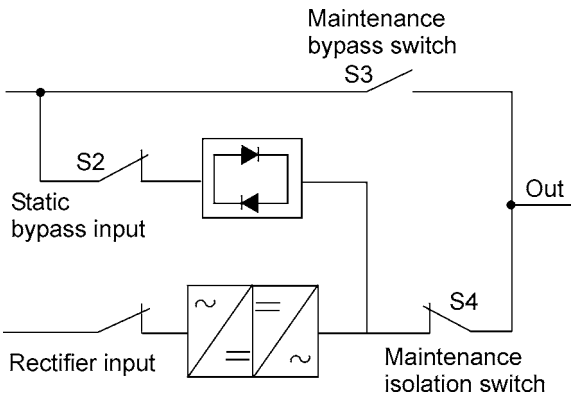
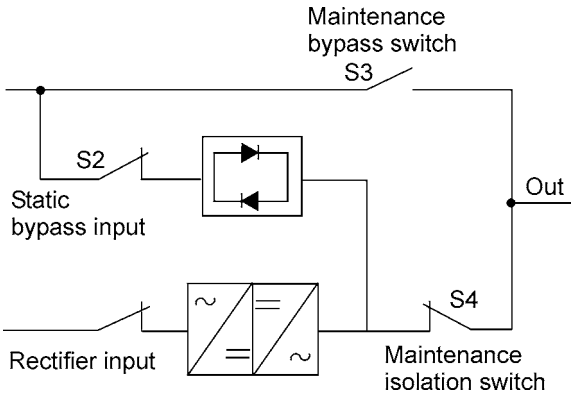


Figure 34. The normal positions of the three MBS switches and rectifier disconnect switch (must be located in the site wiring).

7.11.1 Turn UPS from normal mode to mechanical bypass

The procedure to turn the UPS to mechanical bypass switch is described below.

1. The normal start position should be following:



2. Perform transfer from normal mode to bypass mode as described in paragraph 7.4. Remember to verify the transfer before proceeding the next step.

3. Turn ON the S3 switch to bypass UPS.

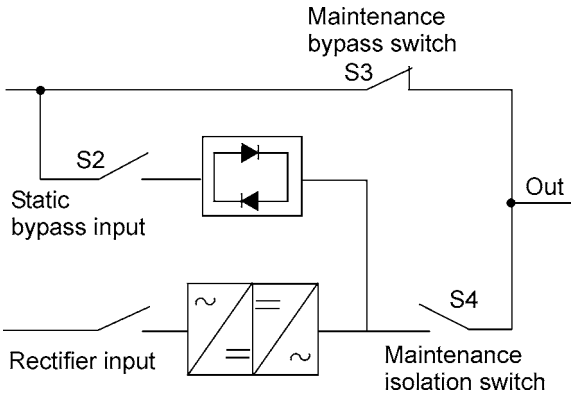
4. Turn OFF the S4 switch to disconnect UPS output:

5. Perform LOAD OFF procedure contained in paragraph 7.9.

6. Turn OFF the rectifier switch to disconnect UPS rectifier input.

7. Turn OFF the S2 switch to disconnect UPS bypass input:

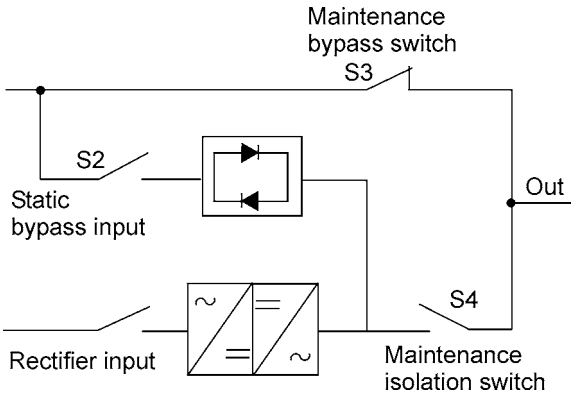
8. UPS is now in the mechanical bypass mode, see below:



7.11.2 Turn UPS from mechanical bypass to normal mode

The procedure to turn the UPS back to normal mode is described below.

1. The normal start position should be following:



2. Turn ON rectifier switch to connect rectifier input to UPS.

3. Turn ON S2 switch to connect bypass input to UPS:

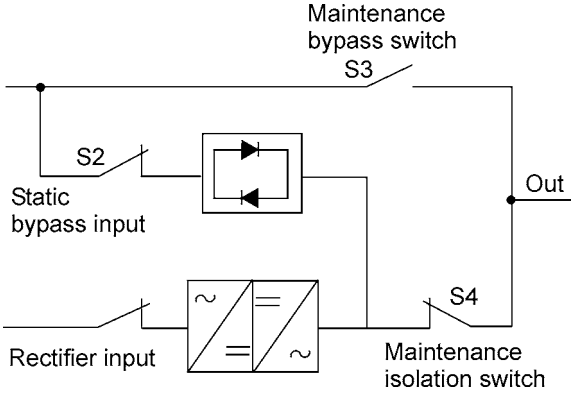
4. Perform UPS start-up procedure (bypass mode) contained in paragraph 7.2.

5. Turn ON S4 switch to connect UPS output to load.

6. Turn OFF S3 switch to disconnect bypass output.

7. Perform transfer from bypass to normal mode as described in paragraph 7.5. Remember to verify the transfer before proceeding the next step.

8. UPS is now in Normal mode, see below:



8 Maintaining the UPS System

8.1 General

The components inside the UPS cabinet are secured to a sturdy metal frame. All repairable parts and assemblies are located for easy removal, with very little disassembly. This design allows authorised service personnel to perform routine maintenance and servicing quickly.

You must schedule periodic performance checks of your UPS system to keep it running properly. Regular routine checks of operation and system parameters will enable your system to function efficiently for many trouble-free years.

8.2 Important Safety Instructions

Remember that your UPS system is designed to supply power **EVEN WHEN DISCONNECTED FROM THE UTILITY POWER.** The UPS module interiors are unsafe until the DC power source is disconnected and the electrolytic capacitors are discharged. After disconnecting the utility power and the DC power, authorised service personnel should wait at least five minutes for capacitor bleed off before attempting internal access to the UPS module.

Warning!

- **Qualified service personnel should perform servicing and maintenance only.**
- **LETHAL VOLTAGE PRESENT. This unit should not be operated with the cabinet doors open or protective panels removed. Do not make any assumptions about the electrical state of any cabinet in the UPS system.**

Since each battery string is an energy source in itself, opening the Battery Circuit Breaker does not de-energise the voltage within the battery string. **DO NOT ATTEMPT TO ACCESS ANY INTERNAL AREA OF THE BATTERY STRING YOURSELF. VOLTAGES ARE ALWAYS PRESENT IN THE BATTERY STRINGS.** If you suspect that a battery string needs service, you should contact your service representative.

If the string requires service, refer to the battery manufacturer‘s operating manual for instructions on battery maintenance, or contact your service representative.

Observe these precautions when working on or around batteries:

- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of batteries or battery cabinets.
- Disconnect the charging source prior to connecting or disconnecting terminals.
- Determine if the battery is inadvertently grounded. If it is, remove the source of the ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock will be reduced if such grounds are removed during installation and maintenance.
- When replacing batteries, use the same number of sealed, lead-acid batteries.
- Proper disposal of batteries is required. Refer to your local codes for disposal requirements.

See chapter 10. Recycling the used UPS or batteries

8.3 Performing Preventive Maintenance

The UPS system requires very little preventive maintenance. However, the system should be inspected periodically to verify that the units are operating normally and that the batteries are in good condition.

8.3.1 DAILY Maintenance

Perform the following steps daily:

1. Check the area surrounding the UPS system. Ensure the area is not cluttered, allowing free access to the unit.

2. Ensure the air intakes (vents on the front doors) and exhaust opening (on top of the UPS cabinet sections) are not blocked.

3. Ensure the operating environment is within the parameters specified in Product Specifications.

4. Ensure the UPS is in Normal mode (Normal status indicator is illuminated). If an alarm lamp is illuminated or the Normal status indicator is not illuminated, contact your service representative.

8.3.2 MONTHLY Maintenance

Perform the following steps monthly:

1. Monitor system parameters from the Control Panel.

2. Check the two air filters (located behind the front door) and replace as necessary. The filters size is 203 x 381 x 25 mm (10″ × 16″ × 1″). To remove filter:
   a. Open front door latch and swing door open.
   b. Slide filter up and remove from cabinet.
   c. Slide new filter into brackets until seated on bottom brackets.
   d. Close door and secure with latch.

3. Record the check results and any corrective actions in a suitable log.

8.3.3 ANNUAL Maintenance

Only authorised service personnel familiar with maintenance and servicing of the UPS system should perform annual preventive maintenance. Contact your service representative for more information about service offerings.

8.3.4 BATTERY Maintenance

Contact your service representative for battery maintenance. Only authorised service personnel should perform Battery replacement and maintenance.

8.4 Advanced maintenance

In Terminal Mode (e.g. HyperTerminal program in Windows operating system) and with serial RS232 communication interface (Settings: 19200-8-N-1-N), the user can request the following:

- Display UPS control panel by pressing and holding [ESC], then press [V].*
- Display Event History by pressing and holding [ESC], then press [H].
- Display Node Bits Setup by pressing and holding [ESC], then press [N].
- Display any new event by pressing and holding [ESC], then press [L].*
- Display Battery Log by pressing and holding [ESC], then press [B].

  * Terminate the functions [ESC] + [V] and [ESC] + [L] by pressing and holding [ESC], then press [Q].
- Saving to the file is done the following way in the HyperTerminal program:

1. Select "Transfer" --> "Capture Text" ; Save file by giving the file name
2. Start to download the UPS event history -> ESC+H
3. When the log is downloaded ->Transfer->Capture Text ->Stop
4. You have now saved the log to file.

Note!

The brackets ([ ]) in the following bullets indicate standard keyboard characters. To use a key combination, hold down the Escape key and press the indicated letter key.

8.4.1 Display UPS Control Panel

When this function is invoked, a facsimile of the UPS control panel is displayed on the terminal screen. All controls are functional and will control the UPS remotely. The only exception is the Load Off control that requires the operator to press and hold the local control for two seconds to shut down the UPS.

To remotely control the UPS or view UPS information, use the escape key legend to control the function normally controlled by the control panel soft keys.

8.4.2 Event History Log

This key sequence prints the entire Event History Log of the UPS at the time the data is requested. The printout begins with the oldest alarm entry in the queue and ends with the most recent. Any alarms that occur while the Event History Log is printing are included in chronological order.

The Event History Log lists up to 511 (127 with 2 XSlot versions) system events in chronological order with the most recent event listed last.

In this mode, system events are continually logged through the serial port to the device connected to the port.

The printed log entries contain a time and date stamp and the alarm text message.

Terminal mode uses this format for printing alarm entries:

MM DD YYYY HH:MM:SS.hh KYWD MESSAGE **** <CR> <LF>

Where:	**Equals:**
MM	Month (2 digits)
YYYY	Year (4 digits)
DD	Day (2 digits)
HH	Hour (2 digits)
MM	Minute (2 digits)
SS	Second (2 digits)
hh	Hundredths of Second (2 digits)
KYWD Keyword	(ALARM, NOTICE, COMMAND, or STATUS)
****	System Diagnostic Information
<CR>	Carriage Return Character (ASCII 13)
<LF>	Line Feed (ASCII 10)

An alarm message is prefixed by the word “CLEAR” whenever an alarm is entered into the Event History Log with a cleared status.

If a port is operating in Terminal mode and is connected to a computer, you can press [Esc] [H] to print the entire log with a firmware version header.

Here is a sample Event History Log printout:

03/11/2004 14:13:12.954 NOTICE: Battery Voltage Low

9 Wiring Parallel systems

The system parallel module (SPM) is recommended and has input connections up to four parallel UPS modules and make-before-brake type of system bypass switch.

The UPS manufacturer provides the following ready-made output tie solutions for parallel UPS System:

Part	Type	Description
1025476	SPM 60-2	Wall-mounted tie cabinet with MBS up to 2 UPS 40-60 kVA
1023540	SPM 80-4	Floor-standing tie cabinet with MBS up to 4 UPS 40-80 kVA
1024687	TC 120-3	Floor-standing tie cabinet up to 3 UPS 100-120 kVA
1024506	TC 160-3	Floor-standing tie cabinet up to 3 UPS 160 kVA

9.1 System Parallel Module

The SPM tie cabinet () provides the UPS connection terminals for the shared load bus. It also enables the make-before-break transfer of the load to the system bypass. This can be used for service or test purposes.

The available SPM tie cabinets have the following maximum power ratings:

SPM type	UPS rating	SPM bypass rating	SPM voltage rating
SPM9390-80kVA-4UPS	1-4 x 80 kVA	320 kVA	230/400VAC 50/60 Hz

X2 and X4 input terminals have a five-wire connection (L1, L2, L3, N, and PE). Power cables with copper conductors should be used to fit the terminals. The wiring shall be done according to the wiring diagram. The terminals and cable routing is shown it the figure below.

Auxiliary contact information of the system bypass switch enables a safe transfer of the load. Pay attention that the signal cable of the bypass switch aux. contact is wired correctly to the UPS modules: the polarity of the signal must be the same for all parallel connected UPS modules because the signal sensing is done against the ground.

Note!

UPS modules should get a minimum of 10 ms leading closed-contact signal when the system bypass switch is turned from UPS to BYPASS position.

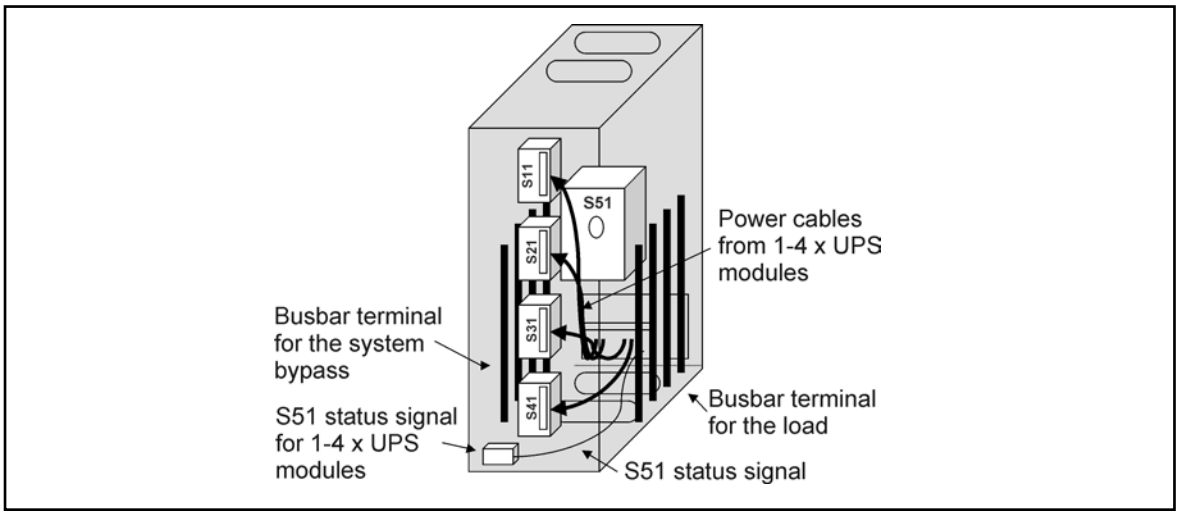


Figure 35. Cable routing of the SPM9390-80kVA-4UPS tie cabinet.

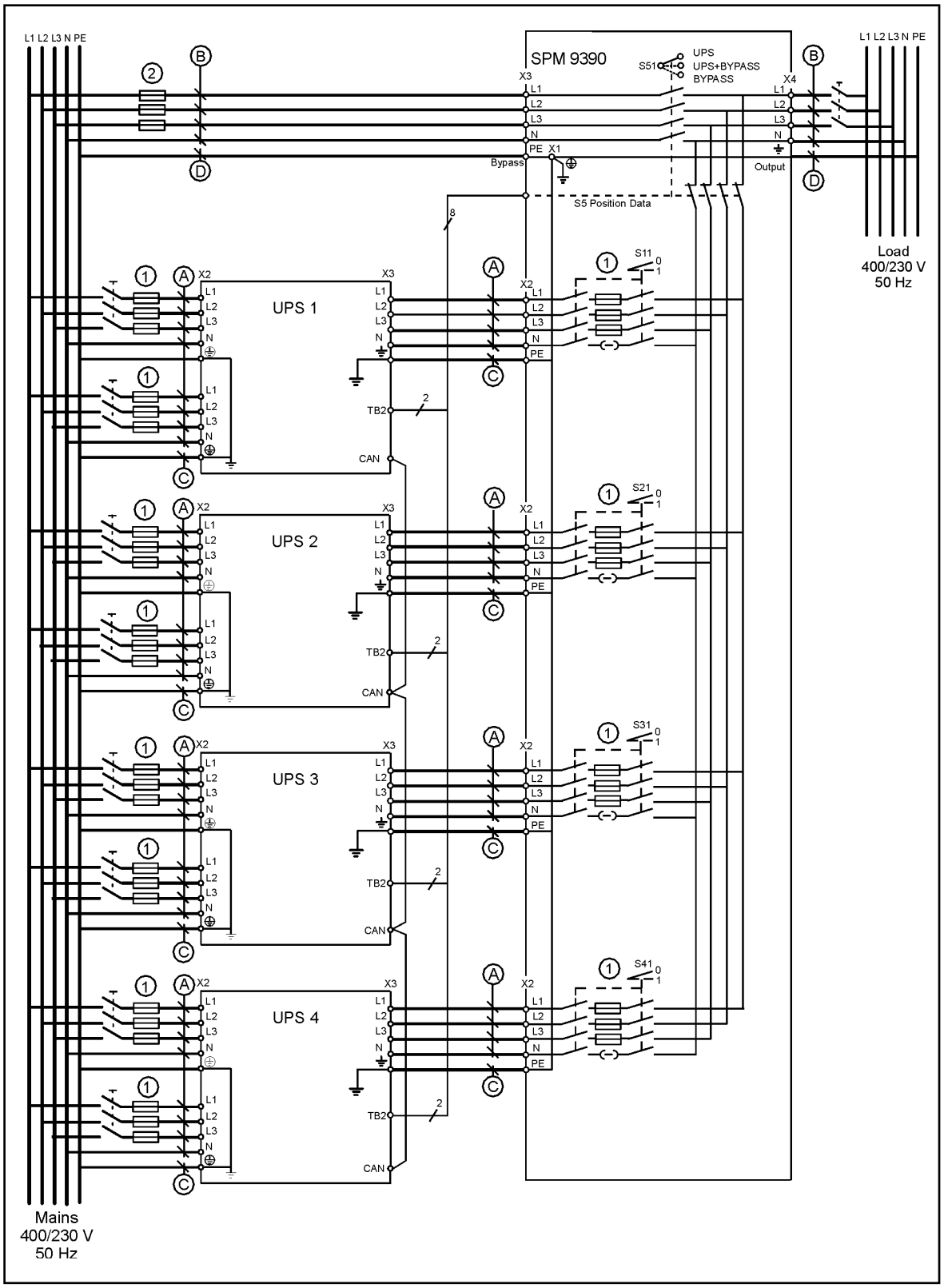


Figure 36. Wiring diagram for HotSync Parallel UPS system up to (4) UPS with SPM.

UPS module	Cable A	Cable C	Fuse 1
40 kVA	35 mm²	16 mm²	80 A
60 kVA	50 mm²	25 mm²	100 A
80 kVA	70 mm²	35 mm²	125 A
100 kVA	95 mm²	50 mm²	160 A
120 kVA	120 mm²	70 mm²	200 A
160 kVA	185 mm²	95 mm²	250 A
SPM	**Cable B**	**Cable D**	**Fuse 2**
40 kVA	16 mm²	16 mm²	63 A
50 kVA	25 mm²	16 mm²	80 A
60 kVA	35 mm²	16 mm²	100 A
80 kVA	50 mm²	25 mm²	125 A
90 kVA	70 mm²	35 mm²	160 A
100 kVA	95 mm²	50 mm²	200 A
120 kVA	95 mm²	50 mm²	200 A
150 kVA	120 mm²	70 mm²	250 A
160 kVA	150 mm²	95 mm²	250 A
180 kVA	185 mm²	95 mm²	315 A
200 kVA	185 mm²	95 mm²	315 A
240 kVA	240 mm²	150 mm²	400 A
320 kVA	2 x 150 mm²	150 mm²	2 x 250 A or 500 A
400 kVA	2 x 185 mm²	185 mm²	630 A
480 kVA	2 x 300 mm²	300 mm²	800 A
640 kVA	Busbar System		1000 A

Table 7. Recommended cables and fuses for the (4) UPS with SPM wiring diagrams.

Required parallel system wiring length should be in accordance with the following rule, as referenced to the diagram below, to ensure approximately equal current sharing, when in static bypass mode:

Total length of 1A + 1B = Total length of 2A + 2B
= Total length of 3A + 3B
= Total length of 4A + 4B

This rule has a tolerance of approximately +/- 10% for the combined input and output wire lengths. If installing only two UPS modules, this requirement is no longer required, as each UPS is capable of supporting the full bypass requirement. However, this would preclude future expansion.

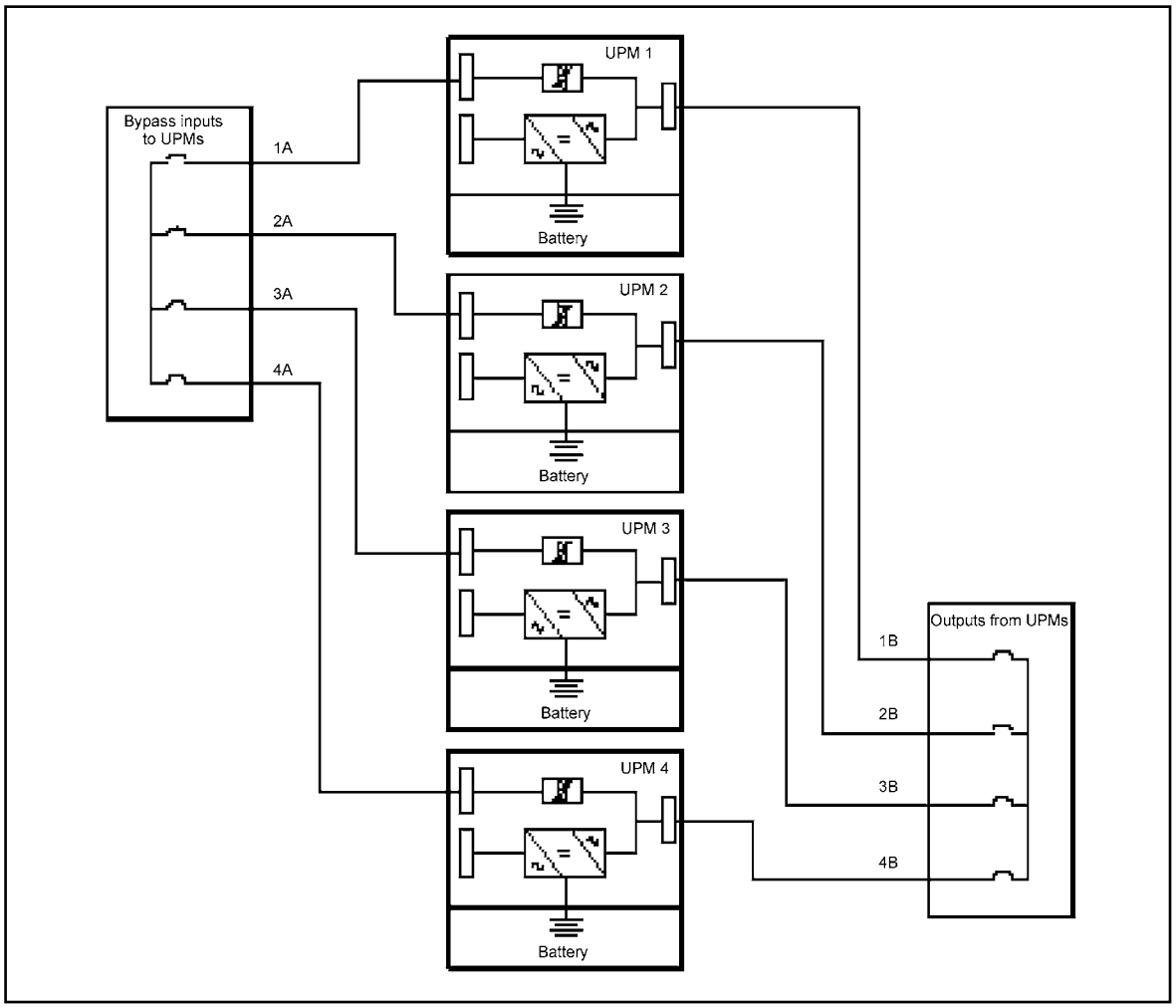


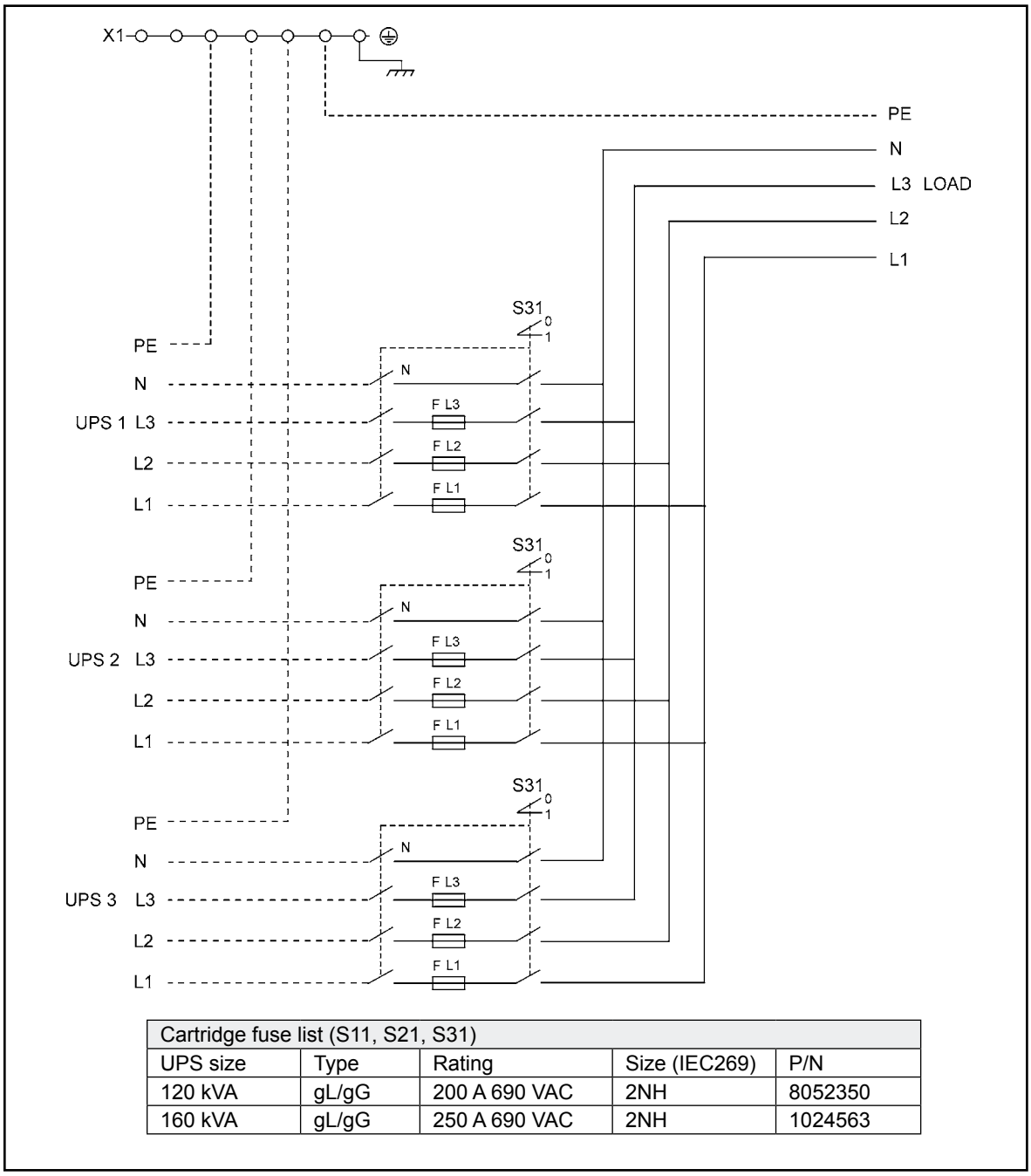
Figure 37. Bypass wiring diagram and cable lenght notes.

9.2. Installation instructions for 120/160 kVA Tie cabinet

Warning!

Some components inside the cabinet contain high voltage, which can injure or kill personnel or damage equipment. All operations inside the cabinet must be carried out only by a qualified electrician.

The wiring between UPS units and the Tie cabinet shall be connected accordingly to the wiring diagram and the wiring procedure below.



Cartridge fuse list (S11, S21, S31)				
UPS size	Type	Rating	Size (IEC269)	P/N
120 kVA	gL/gG	200 A 690 VAC	2NH	8052350
160 kVA	gL/gG	250 A 690 VAC	2NH	1024563

Figure 38. Wiring diagram of the 120 and 160 kVA Tie cabinet

Please refer to main User's and Installation Guide (1022403) for sizing cables

Wiring procedure:

1. If not already open, unfasten front door latch and swing door open.
2. Remove the door by opening a screw from the bottom hinge.
3. Place the door to its correct position.
4. Remove the switches S11, S21, S31 and the screws from the plate.
5. Remove cabinet top or bottom wire entry landing plate to drill or punch wire ways.

6. Route input and output cables through wire way to the terminals of the cabinet.

7. System output cables (L1, L2, L3, and N) should be connected to copper bars either top or bottom of the cabinet.

8. System input cables (L1, L2, L3, and N) should be connected next to the fuses: S11, S21, S31.

9. PE cables should be connected to terminal X1 at the bottom of the cabinet.

10. Place the metal plates to correct positions and fix the switches S11-S31 to their correct position.

11. Close the door and secure with a latch.

Dimensions

Weight of the Tie cabinet is 217 kg.

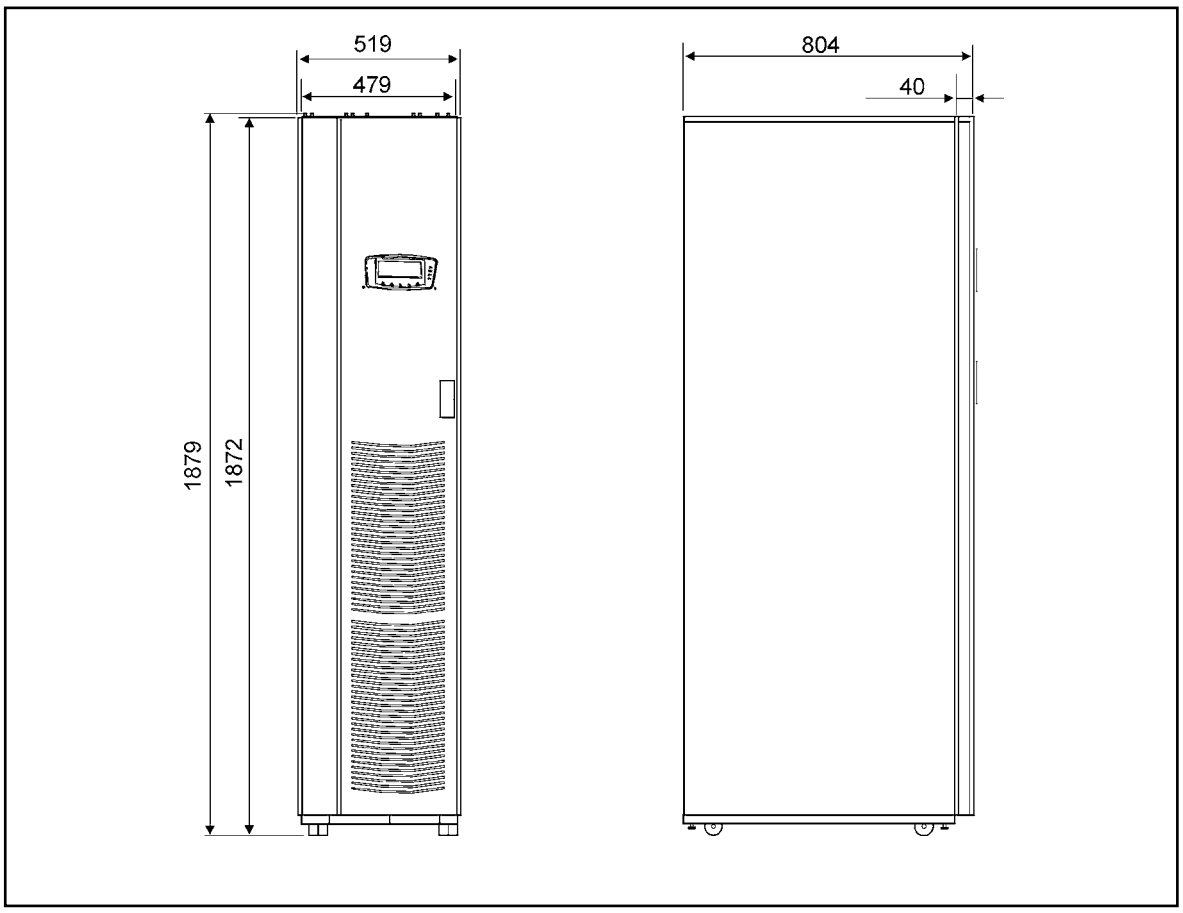
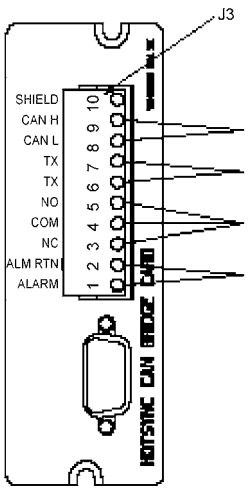


Figure 39. Dimensions of the 120/160 kVA Tie cabinet

9.3 XSlot Hot Sync card

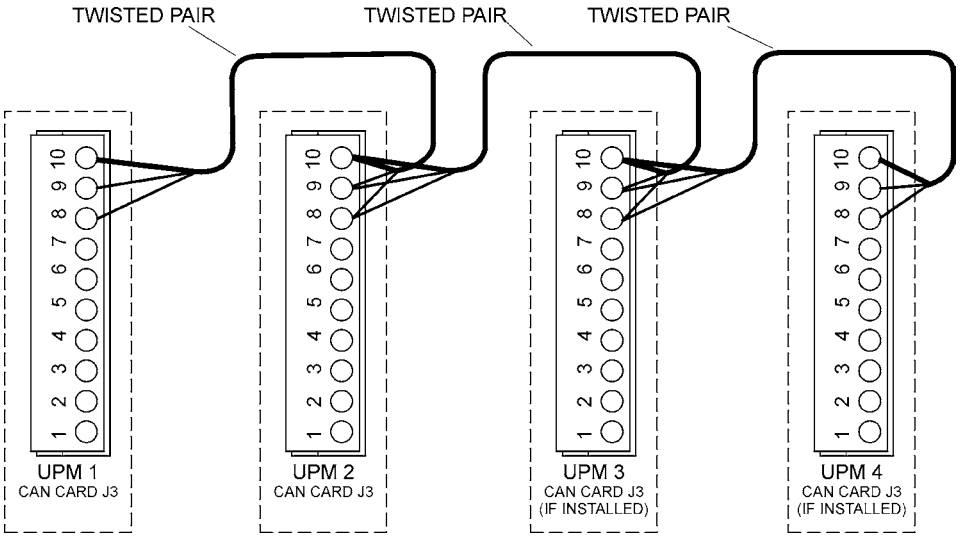
The parallel interface wiring requires the Hot Sync CAN bridge card.



Terminal J3	Name	Description
1	Alarm	Programmable UPS alarm. Activated by a remote dry contact closure.
2	Alarm Rtn	
3	Alarm Relay NC	Normally-closed contact opens when UPS is on bypass.
4	Alarm Relay Com	Bypass contact return.
5	Alarm Relay NO	Normally-open contact closes when UPS is on bypass.
6	TX	Remote Monitor Panel (RMP), Relay Interface Module (RIM), or Supervisory Contact Module (SCM) Connections.
7	TX	
8	CAN L	Controller Area Network (CAN) Input for parallel operation.
9	CAN H	
10	Shield	

Figure 40. Hot Sync CAN Bridge card and terminal interface

The Hot Sync system communication wiring procudure should be done with shielded twisted pair as presented in the figure. The maximum length is 40 meters with shield connected to the terminal pin 10 from both cable ends. Pay attention that you do not mix the polarity among the UPS modules.



CAN Wiring Terminations			
From UPM 1 CAN Card	To UPM 2 CAN Card	To UPM 3 CAN Card (If installed)	To UPM 4 CAN Card (If Installed)
J3-8 (L)	J3-8 (L)	J3-8 (L)	J3-8 (L)
J3-9 (H)	J3-9 (H)	J3-9 (H)	J3-9 (H)
J3-10 (Shield)	J3-10 (Shield)	J3-10 (Shield)	J3-10 (Shield)

Figure 41. CAN cable wiring diagram.

Note!

The Hot Sync CAN Bridge card has build-in termination resistor enabled by jumper J7. The default jumper setting without termination resistor is J7: Pin 2-3. Place the the jumper J7 to correct setting: the first and last UPS modules should have the CAN bus termination resistor enabled (Jumper J7: Pin 1-3).

In addition to the CAB bus cable a back-up pull-chain cable is needed for bypass operation.

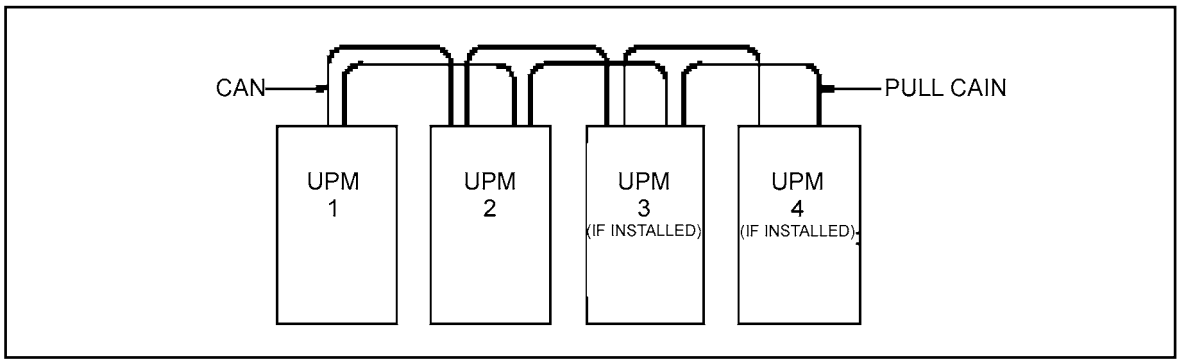


Figure 42. Communication wiring for parallel UPS system.

Building Alarm Pull Chain Wiring Terminations			
From UPS 1	To UPS 2	To UPS 3 (If installed)	To UPS 4 (If installed)
TB2-1 (BA 2)	TB2-1 (BA 2))	TB2-1 (BA 2)	TB2-1 (BA 2)
TB2-2 (Rtn)	TB2-2 (Rtn)	TB2-2 (Rtn)	TB2-2 (Rtn)

Bypass Relay Pull Chain Wiring Terminations	
All UPSs	
From	To
TB2-1 (BA 2)	TB2-3 (Byp)
TB2-2 (BA 2 Rtn)	TB2-4 (Byp Rtn)

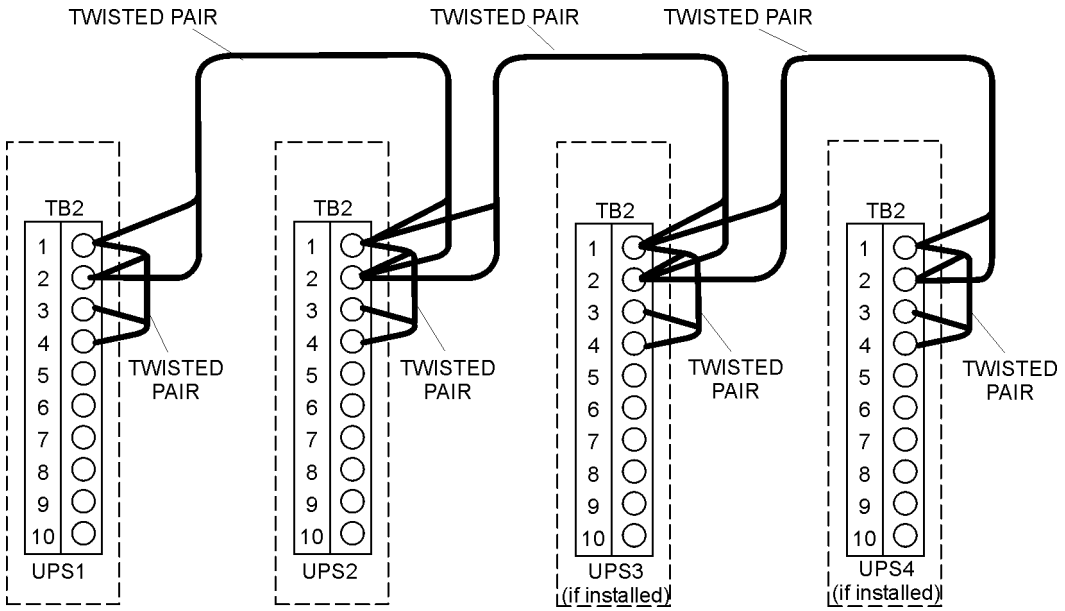


Figure 43. Bypass control (pull-chain) wiring for parallel UPS system.

10 Recycling the used UPS or batteries

Before scrapping UPS or its battery cabinet, the battery bank must be removed. Local requirements must be followed in battery recycling or discard. The removal of batteries is allowed only by authorised service personnel due to high energy and voltage.

Do not discard waste electrical or electronic equipment in the trash.
For proper disposal, contact your local collecting/recycling/reuse or hazardous waste center and follow the local legislation.

These symbols indicate on a product:

Use proper local collecting centers meeting local legislation when handling waste of electrical and electronic equipment.

WARNING!

HAZARDOUS MATERIALS. Batteries may contain HIGH VOLTAGES, and CAUSTIC, TOXIC and FLAMMABLE substances. Batteries can injure or kill people and damage equipment if used improperly. DO NOT DISCARD unwanted batteries or battery material in the public waste disposal system. Follow ALL applicable, local regulations for storage, handling and disposal of batteries and battery materials.

11 Dimensional drawings

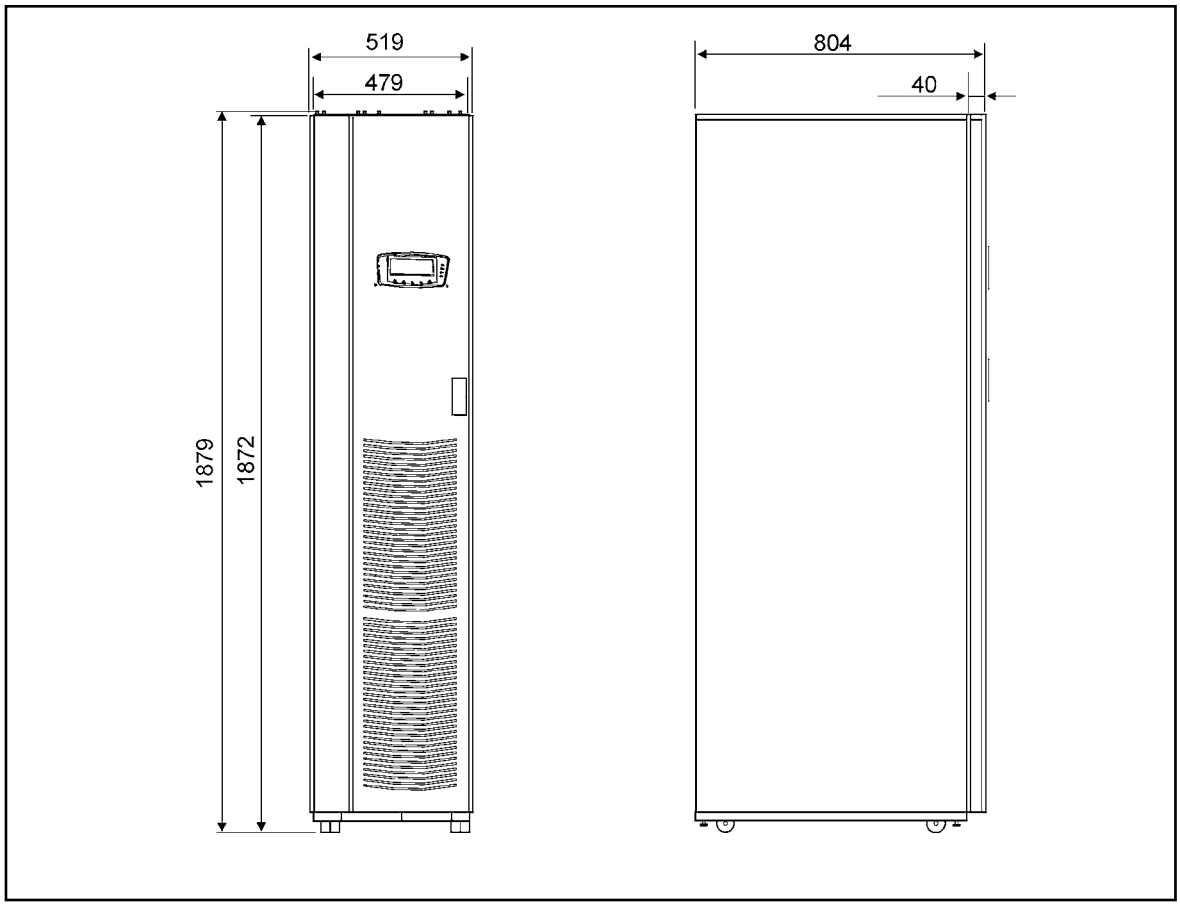


Figure 44. UPS cabinet dimensions. (40-80 kVA)

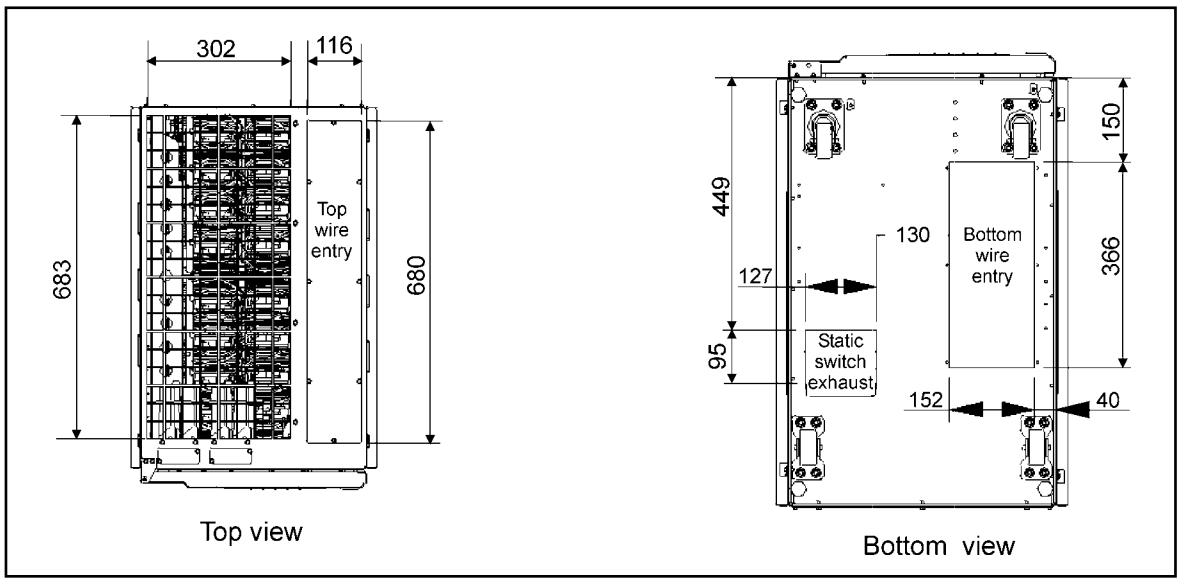


Figure 45. UPS cabinet top and bottom dimensions. (40-80 kVA)

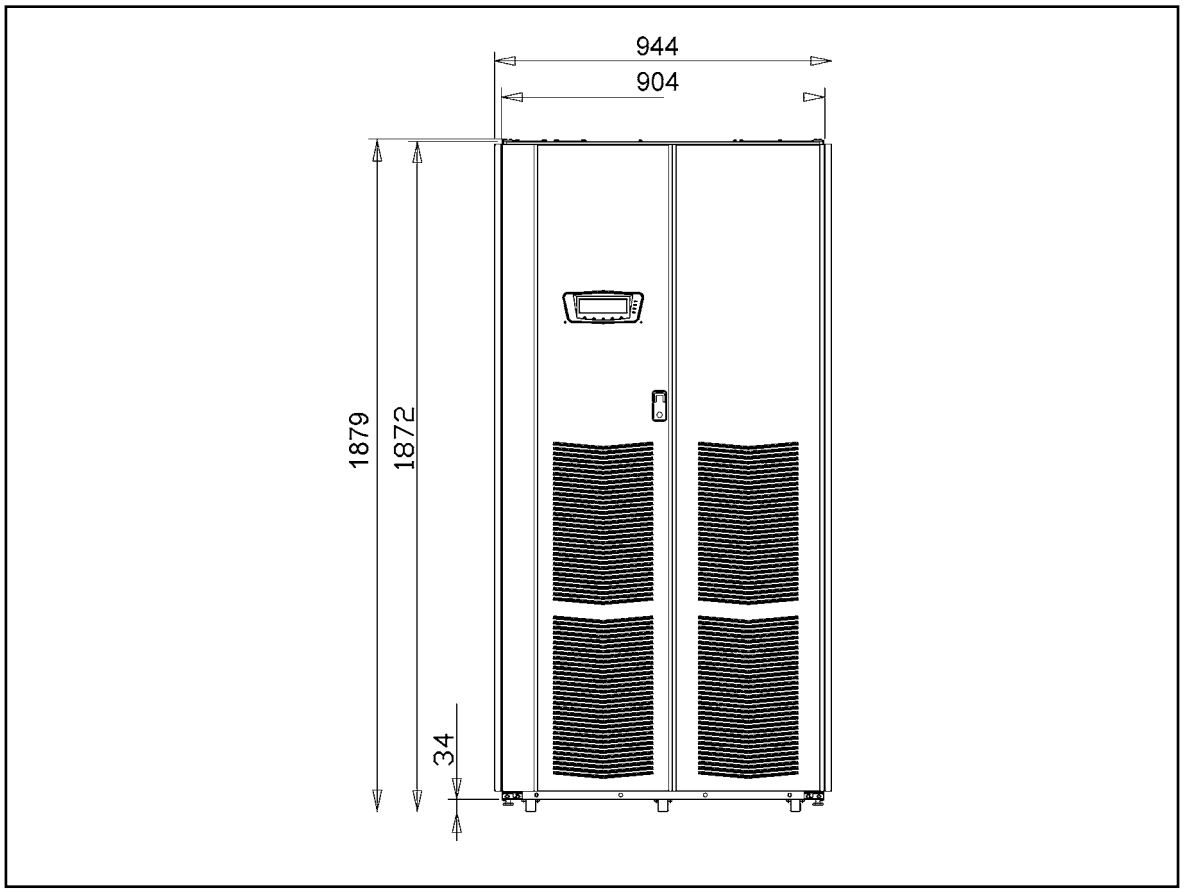


Figure 46. UPS cabinet dimensions (100-160 kVA)

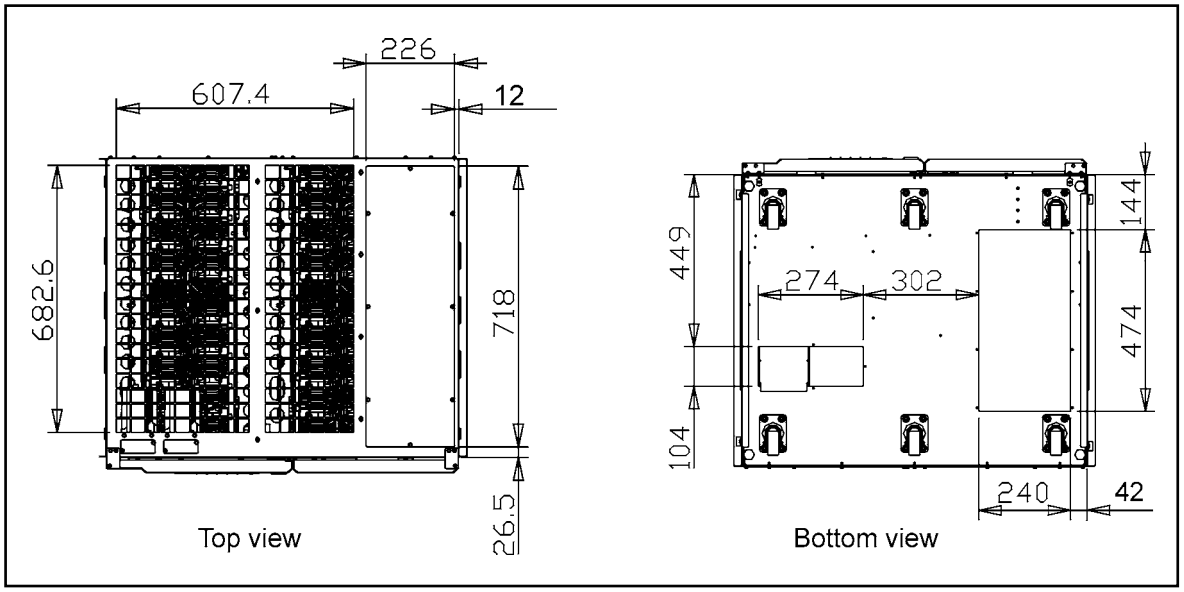


Figure 47. UPS cabinet top and bottom dimensions (100-160 kVA)

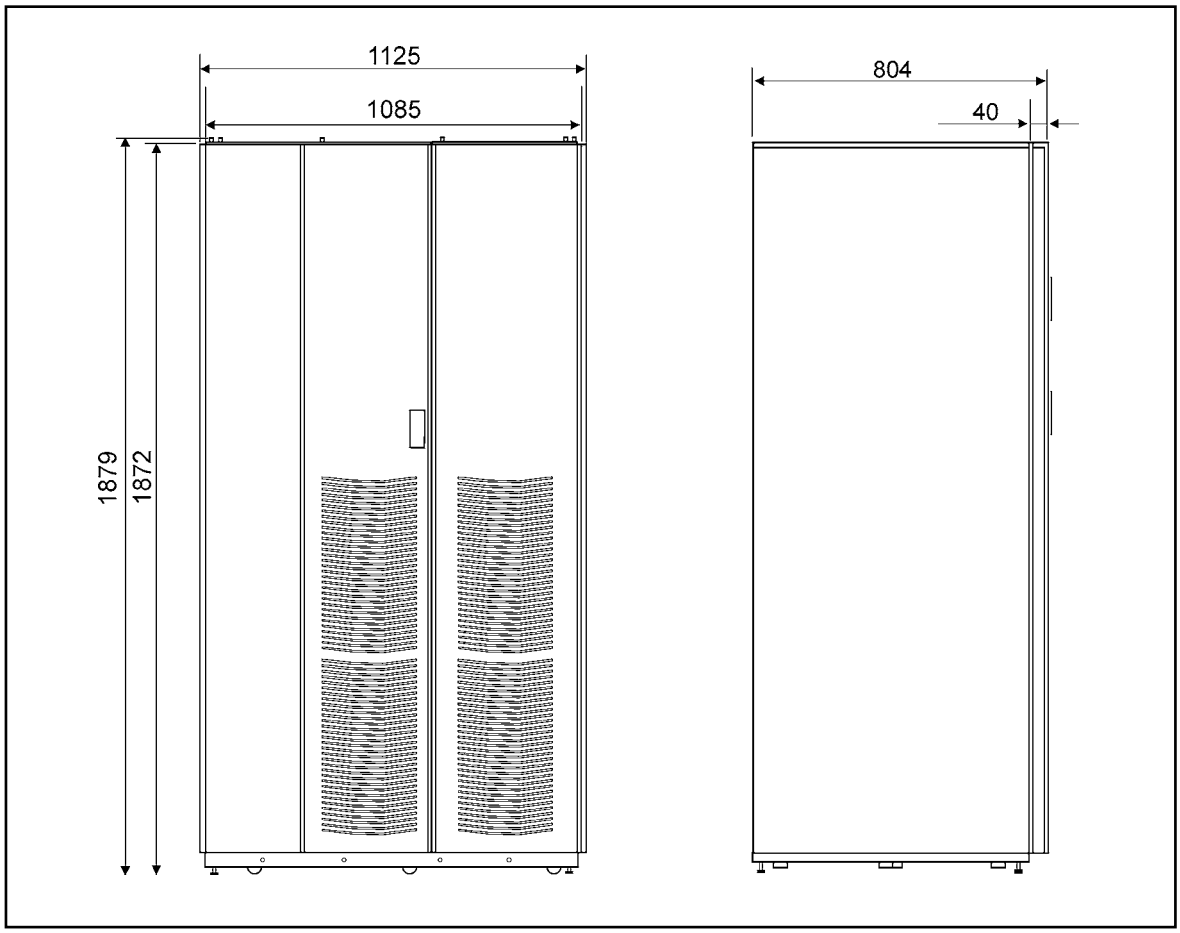


Figure 48. Large battery cabinet dimensions.

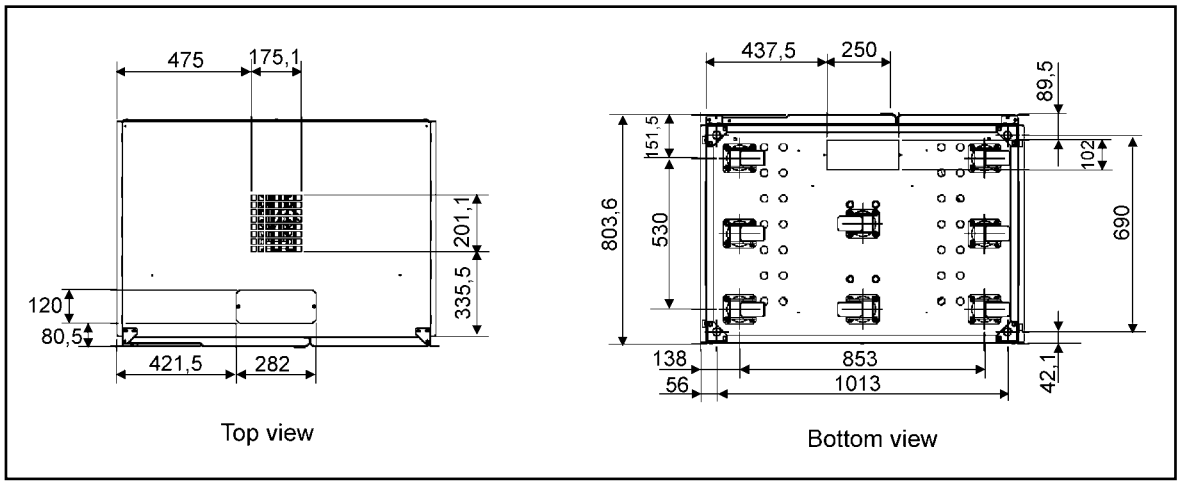


Figure 49. Large battery cabinet top and bottom dimensions.

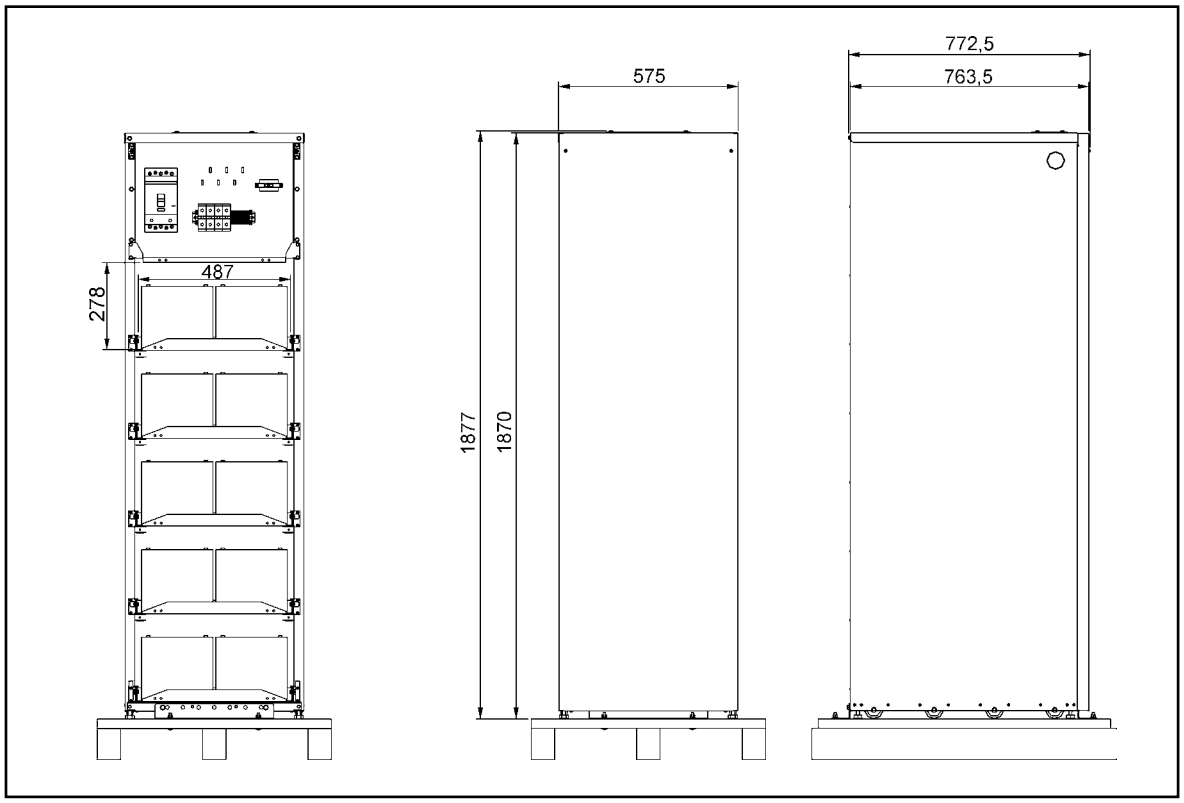


Figure 50. Small battery cabinet dimensions and empty space for batteries

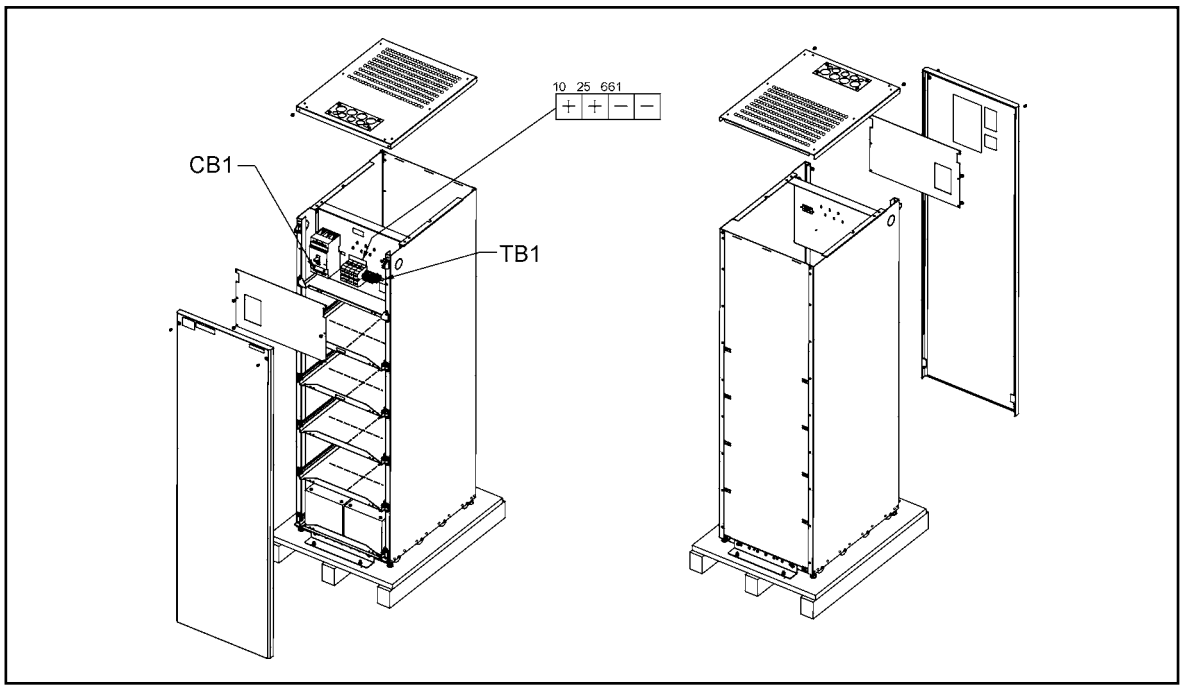


Figure 51. Small battery cabinet side/top cabling and loaction of terminals

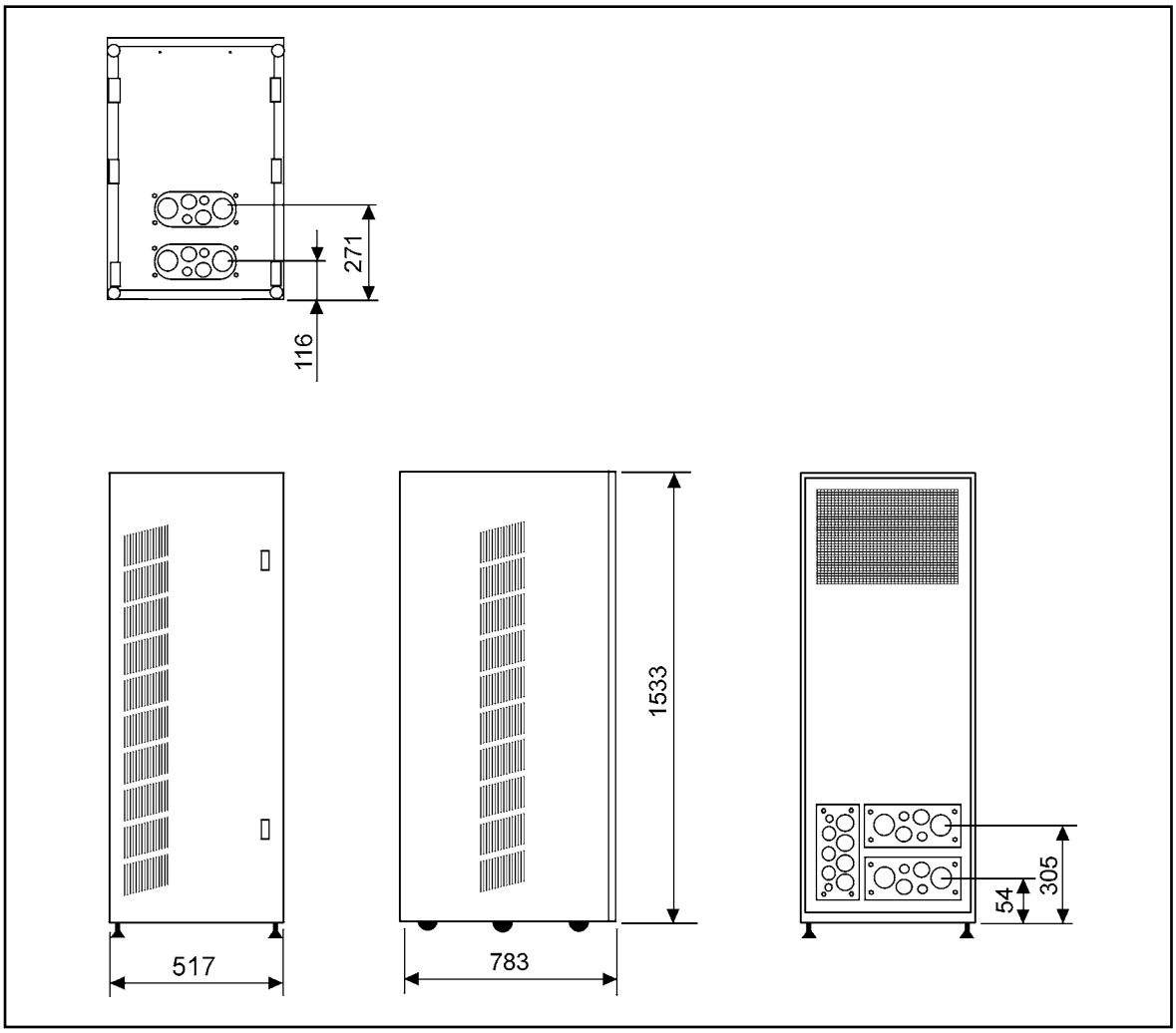


Figure 52. HotSync System Parallel Module (SPM9390-80 kVA-4UPS) dimensions

12 Technical data

12.1 Standards

UPS	40 kVA	60,80 kVA	100, 120 kVA	160 kVA
Safety	IEC/EN 62040-1-1, EN 60950			
EMC	IEC/EN 62040-2, UPS for restricted sales distribution			
Product	IEC/EN 62040-3			

12.2 Environmental specification

UPS	40 kVA	60,80 kVA	100, 120 kVA	160 kVA
Amb. Temperature	IEC/EN 62040-1-1, EN 60950			
Relative humidity	0 to 95%, no condensation allowed			
Storage	–25°C to +60°C, excluding batteriesIEC/EN 62040-3			
Altitude	1500 m above sea level			
Vibration	max 0.3 mm (2 to 9 Hz), max 1 m/s2 (9 to 200 Hz) sinusoidal			
Noise (ISO7999)	65 dB(A)		70 dB(A)	
Cooling air flow	588 liters/sec		1076 liters/sec	

12.3 Mechanical configuration

UPS	40 kVA	60,80 kVA	100, 120 kVA	160 kVA
Dimensions - Width - Depth - Height	 519 mm 808 mm 1879 mm		 944 mm 808 mm 1879 mm	
Weight - UPS - Small BAT 38 Ah - Small BAT 200WPC - Large BAT 250WPC - Large BAT 305WPC - Large BAT 500WPC	 313 kg 700 kg 1176 kg 1270 kg 1430 kg 2188 kg	 313 kg 700 kg 1176 kg 1270 kg 1430 kg 2188 kg	 480 kg 700 kg 1176 kg 1270 kg 1430 kg 2188 kg	 530 kg 700 kg 1176 kg 1270 kg 1430 kg 2188 kg
Min. clearance - Top - Front - Back, both side	 460 mm (ventilation requirement) 915 mm (service requirement)			
Colour	RAL 9005 black			

12.4 System input

UPS	40 kVA	60,80 kVA	100, 120 kVA	160 kVA
Rectifier input	3-phase + PE; Nominal Voltage 400 V 50/60 Hz; Voltage tolerance -15% – +10% (max -30% – +20%); 45 – 65 Hz			
Bypass input	3-phase + N + PE; Nominal Voltage 400 V 50/60 Hz; Voltage tolerance ±10%; ±3 Hz			
Frequency	45 to 65 Hz			
Input distortion	ITHD 3% – 5% (1% VTHD mains input)			
Power factor	0.99			

12.5 System DC circuit

UPS	40 kVA	60,80 kVA	100, 120 kVA	160 kVA
Battery monitoring	Advanced Battery Management (ABM™)			
Battery type	VRLA 12 Volts			
Battery qty	40 pcs.			
Nominal voltage	480 Volts (240 cells)			
Float voltage	2.30 VPC			
Cut off voltage	1.70 VPC with 2 min countdown timer; 1.56 VPC absolute value			
Battery charging	10 A	20 A	30 A	40 A

12.6 System output

UPS	40 kVA	60,80 kVA	100, 120 kVA	160 kVA
Active power	36 kW	54, 72 kW	90, 108 kW	144 kW
Voltage	220/380V, 230/400V, 240/415V, user selectable			
Frequency	50 or 60 Hz, user selectable			
Voltage regulation	± 1% (10% to 100% load)			
Harmonics	3% VHD at nominal linear load condition			
Nominal current	57 A	93 A, 115 A	145 A, 173 A	232 A
Short-circuit current	120 A, 300 ms	240 A 300 ms	360 A, 300 ms	480 A, 300 ms
Overload	110% for 10 min (with no bypass available) 125% for 30 sec. (with no bypass available) 150% for 10 sec. (with no bypass available) 1000% for 20 msec. (with integral static bypass)			
	110% for 60 min (mains available) 125% for 10 min (mains available) 150% for 1 min (mains available)			

13 Warranty

13.1 Standard warranty

The product is warranted against defects in design, materials and workmanship for a period of twelve (12) months from its original date of purchase. The local office or distributor may grant a warranty period different to the above and refer to local terms of liability as defined in the supply contract.

The UPS manufacturer is not responsible for

- Any costs resulting from a failure if the installation, commissioning, repair, alternation, or ambient conditions of the equipment do not fulfil the requirements specified in the documentation delivered with the unit and other relevant documentation.
- Equipment subjected to misuse, negligence or accident
- Equipment comprised of materials provided or designs stipulated by the purchaser.

Under no circumstances shall the manufacturer, its suppliers or subcontractors be liable for special, indirect, incidental or consequential damages, losses or penalties.

The technical data, information and specifications are valid at the time of printing. The UPS manufacturer reserves the right to modifications without prior notice.